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THE Amalgamated Association of Iron and Steel-Workers is indulging in its annual convention in Philadelphia, and is making a great show of secrecy. It is stated that financially the Association is falling behind, and that an assessment to cover a heavy drain from the treasury is soon to be called. The association reports a membership of 49,000.

ONE of the most gratifying signs of progress in the utilization of steel is its adoption as the raw material in the manufacture of nails. Among makers it appears to be now the great topic of discussion and the principal object of experimental work. Thus far, the latter has afforded much encouragement, and we hear from a number of sources that the building of steel plants to produce a suitable raw material is contemplated.

WE regret to announce the sudden death, from paralysis, on the 10th ultimo, of Mr. RAIMUNDO DE SANTA MARIA, at the residence of M. ADELON (the legal adviser of Prince NAPOLEON), at Arpajon, near Versailles. Mr. DE SANTA MARIA was a graduate of the Ecole Spéciale des Hautes Etudes, was admitted as a public assayer of the French Mint, and likewise as consulting chemist of several metal-working establishments at St. Denis. He was, during a brief residence in the United States, connected with the Canada Consolidated Gold Mining Company as assayer. His social qualities had attracted many friends to whom his untimely death in the twenty-fourth year of his age will prove a great shock.

FROM Colorado comes the news that the Grant Smelting-Works and the Omaha Smelting and Refining Company were consolidated some time since. For years, the relations of these two concerns have been close, like a number of other works engaged on the one hand, in the smelting of ores, and on the other, in the refining and desilverizing of the base bullion so produced. In their efforts to obtain regular supplies of base bullion, refiners have repeatedly endeavored to do their own smelting in subsidiary works ; but the present consolidation is, we believe, the first on record where two great, independent works have united their interests. For many reasons, the advantages of such a course are great, and we should not be surprised to see the example set by the Grant and Omaha works followed by others.

A SUGGESTION comes from England, which, we believe, spelter manufacturers would do well to consider seriously. All over the world, spelter is cast in thin slabs, probably because it has always been done so since spelter was made. Mr. J. B. SHARP, of Birmingham, urges that in that form it is about as bad as it could be for causing loss by volatilization, when melting in the preparation of copper-zinc alloys, and for retaining lead impurities, which adhere to the lower part of the film in thin flakes which are not removable. He insists that the best way would be to cast the spelter in the form of round 3 or 4-inch ingots, vertically, keeping the mold hot when casting and allowing it to cool slowly. The form would be more convenient and more advantageous for remelting, and the lead would gather at the bottom in a piece which could easily be detached.

MUST THE FARMERS GO?

In the trial of the suit of the People of the State of California *against* the Gold Run Ditch and Mining Company, some interesting evidence was given concerning the injury done by agriculture to the "navigable waters" and alluvial bottom-lands of that State. In California, as everywhere else, the cutting down of the forests on the mountain-sides, while it has not, in our opinion, changed the annual rain-fall perceptibly, has increased the tendency to freshets and floods, by accelerating the collection and flow of meteoric waters. Together with this change, another agency has made itself felt. The annual plowing of the valley soils, loosening the sand, loam, and clay of which they are composed, has given rise to vast quantities of easily-moved *débris*, which are carried down into the rivers and bays. The aggregate injury thus inflicted is undoubtedly greater than any which can fairly be ascribed to the *débris* from hydraulic and placer mining, although in single localities the latter industries may be responsible for direct damage.

A strong argument, which might have been made still stronger by more abundant details, was based upon these facts, in the case alluded to. The shoaling of such streams as the Sacramento having been ascribed to the hydraulic mines, although in fact due in great degree to agricultural *débris*, a comparison was instituted with other streams, at the headwaters of which no mining is carried on. A good example is furnished by Pacheco Creek, in Contra Costa County, the drainage area of which comprises 177·3 square miles of valley and hill land, and 6·5 square miles of marsh. The valley is bounded on the east by the Monte Diablo range (less than 4000 feet high) and on the west by low hills. There is little disintegration from frost.

The soil of this valley is black "adobe," hard in summer and soft when wet. Before 1862, there being little or no plowing in the valley, no change was noticed in the surface of the valley ; but since that time, the hill-slopes have been cut up with innumerable ravines, and the *débris* from this natural hydraulic operation have been carried down to near the mouth of the creek, have covered up 2500 acres to the average depth of two feet, and have formed a large bar in Suisun Bay. Pacheco, once the largest town in the county, has been covered to the depth of eleven or twelve feet, and is nearly abandoned by its inhabitants. Vessels are already unable to come up beyond a point one and a half miles below the old "embarcadero ;" and the entire abandonment of navigation on the creek can only be prevented by vigorous appropriations in the River and Harbor bill.

The above facts indicate that agriculture has led to the average degradation of the surface of this drainage area at the rate of at least one foot in 448 years (assuming the deposit of two feet over four square miles in twenty years, and leaving out altogether the bar in Suisun Bay).

Similar calculations show that Alameda Creek is degrading its drain-

age area at the rate of one foot in 783 years, and Quercus Creek, draining only twelve square miles on the west slope of Mount Diablo, has brought down 2,600,000 cubic yards of *débris* in four years, or at the rate of one foot average depth in eighteen years.

The following estimates are given for the purpose of comparison:

Authority.	Stream.	Drainage area in square miles.	Years required to erode 1 foot from this area.
Humphreys and Abbot	Mississippi.	1,244,000	4,640
Everest	Ganges.	400,000	1,751
Lombardini	Po.	26,400	729

Professor DAVIDSON, of the U. S. Coast Survey, has estimated the drainage area of the Sacramento at 25,000 miles, and its erosion, from all causes other than mining, at 19,000,000 cubic yards, washed annually into the lower river. The State Engineer, on the other hand, estimates the total amount of material carried by the Sacramento in suspension (apart from sand rolled along the bottom) at 18,000,000 yards, and charges mining with 13,200,000 of this. According to Professor DAVIDSON, the Sacramento *natural* erosion would degrade its area one foot in about 1550 years; according to the State Engineer, the rate is only one fourth as great; or, in other words, the Sacramento Valley suffers much less natural erosion than that of the Mississippi, the Ganges, or the Po, although smaller valleys in the State show much more. The State Engineer's conclusion is not probable; Professor DAVIDSON'S is probable; and we wait with interest for somebody to raise the cry that the farmers must go! But these long conflicts are a great waste of time. Why not make every body go, and done with it?

NEW PUBLICATIONS.

THE MATERIALS OF ENGINEERING. Part II. IRON AND STEEL. By ROBERT H. THURSTON, A.M., C.E. New York: John Wiley & Sons. 1883. 8vo, 680 pages. (*Index.*)

We have looked forward with particular interest to Professor Thurston's second volume on *The Materials of Engineering*, because it is in iron and steel that he has done much original work, and because, during the past ten years, such an enormous mass of material has been accumulated by investigators and engineers, both here and in Europe, which Professor Thurston's skill could be trusted to present in a well-digested form. He has gone much farther in one respect than we had expected, and probably, knowing how many who seek in vain for information, in convenient form, on the methods of manufacture of iron and steel, he has reserved more than one third of his work for a treatise on that subject. Forming, as it does, a somewhat elaborate introduction to the main subject, the mechanical qualities of iron and steel, it comes up for discussion first. On the whole, it is well written, and will be sure to give the mechanical engineer a fair idea of the methods and aims of the iron-master and the steel-maker. After a number of chapters, general and historical in character, Professor Thurston takes up iron ores, giving fairly well their characteristics, notes on their occurrence, and numerous analyses from leading localities. He is occasionally led into slight errors, among which we may instance that, on page 71, he declares that zinc found with spathic iron ore is of value in the process of reduction. In speaking of the character of ores, page 95, Professor Thurston says: "When possible, magnetic ores are selected, where the cast-iron produced is to be made into fine cast-steel. Specular or magnetic ores are suitable for 'low' steels and fine wrought-iron, and the other ores make foundry iron of various qualities." We fear that the majority of iron-masters do not live up to these rules, even if they have the choice. Turning to blast-furnace practice, a number of rather ancient-looking furnaces and hot-blast stoves are illustrated, the chapter otherwise being a careful compilation from the very voluminous literature on the subject. The chapter on wrought or malleable iron is similarly elaborate, and particular attention is paid, as should be the case, to rolling, because it is at this stage that the interest of the constructing engineer in the methods of manufacture begins, and here too, Professor Thurston is evidently more at home. Over fifty pages are devoted to the manufacture of steel, and constitute the best summary of that industry which we have yet seen.

This concludes the first part of the work, the chapter following treating of the properties of iron and steel, a chapter into which Professor Thurston has crowded much of the material so industriously accumulated by engineers and metallurgists, during the past ten years, on the relations between the mechanical properties and the chemical composition of metals. This chapter, too, is worthy of close study by both mechanical and metallurgical engineers. Chapter IX., on the strength, elasticity, and resilience of iron and steel is of course the *pièce de résistance* of the work, covering, as it does, over one hundred pages. It discusses elaborately the methods of testing, and gives the results of standard work in this direction, while the following chapter discusses the conditions affecting strength, the effect of temperature and time, age and exposure, crystallization, the flow of metals, shock, overstrain, and repeated variations of load as modifying the resistance of iron and steel. A useful chapter on specifications, tests, and inspection brings the work to a close. We do not hesitate to urge all those who are interested in the subjects discussed—and what iron and steel master and mechanical engineer is not?—to closely study the book, which presents so much valuable material in a clear form, much of it being directly available to those only who have access to large libraries. A very large proportion of the data is the result of personal researches and inquiry.

THE air-receiver at Grace furnace, owned by the Brier Hill Iron and Coal Company, of Youngstown, Ohio, exploded recently, dangerously wounding the engineer and injuring two others. The engine-house was blown to pieces.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

The Statistical Position of Copper.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Referring to the letter from your correspondent "Specular," in your issue of June 2d, in which he figured a surplus of 75,000,000 pounds of copper to be on hand at the end of the current year, and to your editorial in your issue of August 4th on the Copper Market, I beg leave to submit the following detailed figures, which I believe to be nearly correct:

	Pounds.
1. "Specular" assumed a surplus of 42,000,000 pounds on hand January 1st, 1883. I believe this to be too large; but for the sake of comparison I start on the same basis,	42,000,000
2. You state in your editorial that the lake production is increasing; but the figures for the June production show a falling off of 750,000 pounds of fine copper, as compared with the average of last year—assuming the production to be the same—and present prices are certainly no encouragement for increased production. The production will be 55,000,000	55,000,000
3. The Western mines at present producing, known to the writer are:	
Arizona—The Copper Queen	7,500,000
Detroit	3,000,000
Old Dominion and Long Island	3,500,000
Longfellow	2,500,000
All others	2,500,000 19,000,000
Montana—Montana Copper Company	8,000,000
Parrott Copper Company	6,000,000
Belle Copper Company	2,500,000
Anaconda and Allied mines	6,000,000 22,500,000
Other production and importation	7,000,000
Grand total	145,500,000
The export sales already made are:	
Lake Copper	10,000,000
Arizona bars	2,000,000
Montana mattes	12,000,000
Other ores, bars, and mattes	3,000,000
Ingot copper not lake	3,000,000
Total	30,000,000

Deducting this amount exported from the total production, we have left 115,500,000 pounds, and taking from this "Specular's" estimated consumption of 72,000,000 pounds, we have left a balance of 43,500,000 pounds.

Necessary stocks on January 1st:	
Lake copper to fill sales from January 1st to June 1st	20,000,000
Stock accumulated at mines	8,000,000
Stocks in hands of dealers, consumers, and in transit; say one month's consumption	6,000,000
Stock in refiners' hands and in transit to refineries	5,000,000
Total	39,000,000

Which, deducted from the above balance, leaves a surplus above bare necessity of 4,500,000 pounds.

If present prices continue, there must still be exported:	
Montana mattes	4,000,000
Ingot copper not lake	1,000,000
Arizona bars (all bars not held here by contract with refiners, as at least one cent per pound of copper more can be realized by shipping than by refining here)	4,000,000
Other ores, mattes, and bars	1,000,000
Total	10,000,000

or a deficiency of 5,500,000 pounds.

In other words, instead of showing a pressing surplus, the indications are, that the market will be short of copper this winter unless a change in prices stops the outward flow of copper. "REFINER."

[The letter of our correspondent confirms, in a general way, the conviction that has been gaining ground, and to which we have repeatedly given expression recently, that here the statistical position is favorable, even taking the lake product at 58,000,000 pounds, which we believe it will certainly reach, especially when the new plant of the Calumet & Hecla is running to full capacity. We presume that the product of the Boston & Colorado works, at Butte City, Montana, is included by our correspondent in the lump figure, 7,000,000, which represents the product of California, Nevada, New Mexico, Colorado, Wyoming, Missouri, the Eastern and Southern States, and copper in imported ores and pyrites. We are inclined to doubt, notwithstanding the fact that Vermont has stopped work and Utah has shipped very little, whether this figure will cover the entire output, but it does not affect the main issue that the metal is now in good shape. The only danger to it is a falling off of values abroad.—ED. E. AND M. J.]

NO MELTING CHARGE ON TRADE-DOLLARS.—At the suggestion of Superintendent Snowden, of the Philadelphia Mint, the acting director of the mint has issued an order to remove the melting charge imposed on trade-dollars deposited at the mint on account of sales of silver bullion. This action was prompted by the thought that, as all holders of trade-dollars who bought them at par and who offered them for conversion into bullion, suffered a loss of 13 per cent, it would be an additional hardship to compel them to pay the melting charge, which amounts to $1 for every "melt," or one per cent.

THE DIVINING-ROD.*

By Rossiter W. Raymond, Ph.D., New York City.

(*Continued from page* 65.)

The Jesuit father, Cæsius (*Mineralogia*, 1636), inclines to deny the efficacy of the rod.

Robert Fludd (*Philosophia Moysaica*, 1638), after mentioning the sympathy existing between the crab or oyster and the moon, between the rue and the fig-tree, between myrtle and the pomegranate, adduces as an instance of similar sympathy between plants and minerals the dipping of a hazel-rod over a vein of silver or gold.

The celebrated chemist, Rudolph Glauber (*Pars Secunda Operis Mineralis*, 1652) affirms from experience, and attributes to a physical property, the efficacy of the rod in exploring for metals.

The Jesuit father, Jean François (*Science des Eaux*, 1653), seems to admit the power of the rod to discover springs, but condemns its use.

The erudite Jesuit father, Kircher (*De Arte Magnetica*, 1654, *De Mundo Subterraneo*, 1678), having proved by experiment that rods of wood alleged to be sympathetic with certain metals, were, when balanced upon pivots, not at all affected by the proximity of these metals, concluded that the sympathy was chimerical. In his later work, he declared roundly that, if the movement of the rod did not proceed from a joke or a cheat on the part of the operator, it was not natural, and ridiculed those who fancied it could be caused by a vapor disengaged from the metal.

Edo Neuhusius (*Sacrorum Fatidicus*, 1658), believes in the working of the rod, and attributes it to a sympathy, or to the stars, or some other cause.

The Jesuit father, Gaspard Schott (*Physica Curiosa*, 1662), pronounces the use of the rod superstitious, or rather diabolical. But he adds, in a foot-note, that pious and honest men have assured him both with regard to the turning of the rod and with regard to the striking of the hours by a ring suspended within a glass (*pulsum annuli filo intra scyphum suspensi et horas indicantis*), that the experiment does not always succeed, and hence, he will not assert that the demon is always acting. The argument appears to be that, if the devil had it in hand, it would not fail. The pious and honest men aforesaid also protested that the phenomenon was natural and not due to fraud or fancy. "*Sed nondum persuaserunt*," pithily concludes Schott. The passage is noteworthy as containing a reference to the wonderful pendulum, which became, at a later day, the subject of scientific treatises, and still survives as a puzzle and amusement for children of all growths.

Sylvester Rattray (*Theatrum Sympatheticum*, 1662) believes in the sympathy of vegetables with minerals. According to him, the hazel is suitable for the discovery of silver, wild pine for lead, olive and palm for gold and silver.

It was in 1666 that Robert Boyle put the question, as member of the Royal Society of London, whether the divining-rod is really moved by the proximity of metal—a pertinent inquiry, which no one seems to have answered by authoritative and thorough experiments, unless we may accept as sufficient those of Kircher above mentioned. The accumulation of contradictory testimony from witnesses of all degrees of competency went on.

Matthias Willenius, a German author, published in 1671 or 1672 a book called *A True Account of the Rod of Mercury*, in which, as the title indicates, he appealed to astrology for the partial explanation of his theme, asserting that the influence of the stars under which the operator is born contributes to the turning of the rod over metals, "by the effect of the harmony established between heaven and earth."

Frommann (*Tractatus de Fascinatione*, 1674), says that, after long hesitation, he has decided that the use of the rod is lawful.

The Jesuit father, Dechales (*De Fontibus Naturalibus*, 1674), inclines to the same opinion, and speaks of the hazel as having been in all times (*omni tempore*) used as an index to springs. This is a curious illustration of the rapidity with which a tradition may come to be considered immemorial. In fact, if we except the striking of the rock in the desert by Moses—which is certainly not a case in point—the first trace of the use of the rod for discovering springs is in the works of the Beausoleils, scarcely fifty years before Dechales wrote his treatise.

Le Royer, a lawyer of Rouen, published in 1674 his *Traité du Bâton universel*, and in 1677 his *Traité des Influences et des Vertus occultes des Etres terrestres*. He declares that the rod by its sympathetic virtue can discover all hidden objects, metals, springs, etc. But he ascribes to it no moral power.

The Abbé Hirnhaïn (*De Typho Generis Humani, sive Scientiarum Humanarum Inani ac Ventoso Humore*, etc., 1676), while scoffing at many reviewed beliefs, admits without question the efficacy of the divining-rod.

St. Romain (*La Science naturelle degagée des Chimères de l'Ecole*, 1679) was one of the first believers in the rod to reject the sympathies and antipathies and to substitute the Cartesian corpuscular hypothesis—of which I shall have more to say hereafter.

Finally, the celebrated botanist, Ray (*Histoire des Plantes*, 1686), classed the divining-rod among superstitions.

This review of the literature of the subject has brought us to the end of an important period, namely, that in which the physical effects of the rod were exclusively discussed, its earlier uses for general divination having gone out of fashion and recollection. Indeed, any attempt to maintain these would have incurred the censure of the church, which would have settled at once the vexed question of agency by denouncing this unauthorized intrusion upon its spiritual prerogative as diabolic. This is indeed what speedily happened, as we shall see. The lost doctrine of moral power reappeared, not among the learned, but out of the obscure mass of the people. In the province of Dauphiny, in the south of France, the practice of the divining-rod, introduced perhaps by the Beausoleils, had become, fifty years after their death, an art followed by many experts, who were called *Hommes à Baguette*. They were employed to find springs of water, hidden treasure, mines, etc., and also to detect criminals, and even to settle disputes as to boundaries when the landmarks were gone. Two farmers, for instance, having a dispute as to the boundary between their farms, instead of going to a lawyer or judge, would send for a diviner. He, walking over the disputed ground, would indicate by the dipping of his rod the spot where the old landmark formerly stood; and this decision was accepted without appeal. Considering the expense of litigation in all times, and the peculiar character of the justice which at that time was sold so dear and worth so little, we may fairly say that, whatever be the merits of the divining-rod, the peasants of Dauphiny acted wisely in employing it.

In 1692, a mysterious murder was committed at Lyons. A wine-merchant and his wife were found dead, lying in their cellar near the bloody ax with which they had been slain. A neighbor urged the authorities (who seem to have had no clue to the murderers) to employ a rich peasant of Dauphiny, already famous as an expert with the divining-rod. This man, Jacques Aymar by name, was sent for—or rather it was not necessary to send for him, since he proved to be already on hand in the city, by the time it was decided to engage his services. This fact is significant, as giving the key to what turned out to be an extraordinary piece of clever detective work. A careful analysis of the numerous official and other records of this case show it to be quite possible that the diviner had obtained important clues before he was publicly set to work. He first demanded to be taken to the scene of the crime that he might get his "impression." This consisted in a sort of shuddering, accompanied with signs of agitation, pain, and exhaustion, and manifesting itself besides in the dipping of his rod. This took place at the spot where the bodies had lain, the spot where the ax was found, and also in the shop above, at various points which he declared to have been occupied or touched by the criminals. Having thus obtained a thorough impression, after the fashion of a bloodhound getting a scent, he started, though it was night, and followed with his rod the alleged course of the fugitives, passing without hesitation through many unlikely places, as far as one of the gates of the city. Next morning, he resumed the trail, and tracked it to the house of a gardener, where he declared that the criminals, either two or three in number, had stopped. The gardener and his wife denied all knowledge of them, and Aymar, consulting his rod, declared that neither had touched the murderer. But the rod dipped violently over two young children of the house, who thereupon confessed that three men had stopped there the day before, and had drunk wine at a table, which, by the way, had also been indicated by the rod. The children said they had kept this a secret, because they feared being punished for leaving the door unlocked while their parents were away. After some further delays and preliminary tests, the magistrates determined to let Aymar pursue the murderers. He declared that they had taken a boat down the Rhone, and he followed them with an escort in the same manner, landing from time to time at different points where he said they had stopped. His pursuit was continued for a number of days with various interruptions, the assigned causes of which seem to have been sometimes but pretexts, and permit the suspicion that the intervals were employed by him in getting information in other ways. However this may be, he finally brought up at the prison of Beaucoire, and after applying his rod in succession to the inmates, pointed out as one of the Lyons murderers a hunchback, recently arrested for larceny. This man, being taken back to Lyons, was recognized at several points on the road as having passed just after the murder, and finally, frightened by the accumulated evidence against him, made a full confession, and was subsequently broken alive. The other two murderers Aymar professed to follow to the sea, and at sea along the coast, until, as he alleged, they escaped from the kingdom.

So long as there was no doubt of Aymar's sincerity, this discovery of the criminal by the aid of the divining-rod seemed indeed marvelous. But it is not more wonderful than many detective operations in which the rod has played no part: and it is easy to trace the possible or probable methods which he employed. If, for instance, during the period just preceding his engagement by the magistrates, he had, in coming to town from his residence, fourteen leagues distant, or in hanging about the town, where every body was talking of the crime, picked up in any way the circumstances of the three fugitives entering the house where the children were, it is almost inevitable that he would have obtained also some general description of their appearance, and I need scarcely remark that the subsequent tracking of a hunchback would be no very difficult matter. It should be added here that the judges who sentenced the hunchback explicitly declared that they attached no weight to the indications of the rod as direct evidence of his guilt, but condemned him wholly upon his own confession, confirmed by abundant circumstantial evidence.

But this achievement of the rod, attested as it was by official records and by the public confession and execution of the criminal, made a great sensation in France; and Aymar was called to Paris, where both the court and the *savants* interested themselves greatly in his mysterious powers. Many marvelous feats are reported of him there; but the shrewd and rigorous experiments of the Prince de Condé exposed the emptiness of his pretensions. It was Aymar's claim that his rod was sensitive to the particular object which he was at the time seeking. When he sought a given murderer, the track of some other murderer would not divert it. When he was pursuing a criminal, he could not be led astray by subterranean water or treasure. If he felt these things in passing, his feeling was nevertheless distinguishable from that connected with his intention, etc. He could, at will, seek any given object, and, when doing so, could not be deceived. Unfortunately for this claim, the tests of the prince deceived him very often. For instance, a purse of money was shown him, and after he had got his "impression" of it, it was taken out to be buried in the garden, but, instead of burying it, the person who had it kept it in his pocket. Aymar proceeded to the garden, and, undisturbed by the immediate neighborhood of the money in the pocket of a bystander, located the spot where he said it was buried. In another case, he detected the gold of the gilding of a chair which was covered so as to permit a glimpse of its ornaments; but he sat on a similar chair, and walked through a saloon containing many of them, all completely covered, without discovering any gold. In another case, a window was designedly broken in a palace. Aymar was sent for to trace the thief, who, he was informed, had recently stolen some money from the palace. His rod promptly indicated the broken window

* Read at the Boston Meeting of the American Institute of Mining Engineers.

as the road by which the thief had entered, and he proceeded to trace also the route of flight, although no such theft had ever occurred. But so long as these and similar failures were not made generally public, Aymar continued to enjoy much celebrity, and no doubt it was enough to turn the head of a peasant to be the object of such attention. Growing more audacious, he undertook to reveal character with his rod, and on one occasion, having received a fee from a gentleman of the court, with the request that he would discover whether the gentleman's sweetheart was true to him, he sent for the lady's servant, and demanded of him another fee as a condition of certifying her virtue. Scandals of this kind became so bad that the Prince de Condé publicly exposed Aymar, and he returned to his home. On the way, however, in passing through a village, he took occasion to designate five or six of the most respectable houses as the abodes of wicked women, which made a great uproar. I wish I could say that nothing more was afterward heard of him; but unfortunately, it appears that, as late as 1703, this man was employed during the civil war to point out with his divining-rod Protestants for massacre, under the plea of punishment for crimes they had committed.

We find connected with the exploits of Jacques Aymar a new theoretical explanation of the divining-rod. Many persons of more or less scientific training, not doubting the honesty of the man and the genuineness of the sensations which he manifested, cross-questioned him on the subject, and thus accumulated a mass of supposed data for the formulation of the natural law underlying these phenomena. It was at this time that the Cartesian philosophy was dominant in France, and the "subtle matter," "corpuscles," "animal spirits," and "vortices" of Descartes furnished convenient hypotheses to explain almost any thing. The two doctors of Lyons first supplied such hypotheses to the case of Aymar; but the subject was treated at still greater length by the Abbé de Vallemont, in his treatise on the divining-rod entitled *Physique Occulte*, and published in 1693. In this work, he declares that by insensible transpiration particles escape continually from our bodies; that such particles pursue a vertical direction, and strike the divining-rod, which is thus caused to move up and down, assuming a line parallel to the path of the corpuscles. The holder of the rod receives corpuscular effluvia from other human bodies, and various substances, and communicates them through his pores to the rod, thus producing also a movement of revolution. The difference of the skin in different people results in various degrees of susceptibility to particular impressions; but Aymar was, according to the abbé, possessed of an epidermis which could receive all kinds of impressions without confounding them. The abbé says that there is a difference of form among the corpuscular effluvia of springs, minerals, bodies of thieves, those of assassins, those of naughty women, those of landmarks, etc., etc.; in other words, he recognizes the existence of aqueous matter, larcenous matter, murderous matter, etc., and the last-named variety was the only one which produced upon Aymar very painful impressions. This was due, according to his scientific expounder, to the vehemence of remorse which pervades the corpuscles of an assassin. The fact asserted by Aymar that he had detected and followed the trail of a murderer twenty-five years after the murder, and the fact that in almost every instance he necessarily began his researches a day or two after the crime—to say nothing of the cases in which he determined the locality of the landmarks which had been missing for an immemorial period, forced the abbé to a wild hypothesis of the extraordinary levity of the corpuscles, by virtue of which they remained a long time suspended in the air in spite of rain, wind, and even other corpuscles of later origin.

Father Lebrun, in a pamphlet on *The Illusions of Philosophers concerning the Divining-Rod*, printed at Paris in 1693, seriously refuted the system of Vallemont. This pamphlet was republished in the third volume of Lebrun's *Critical History of Superstitious Practices* (Paris, 1702).

But Father Lebrun and a large proportion of those who took part in the discussion rejected the scientific theory altogether and attributed the facts to Satan. It was asserted that not only wicked people might obtain the divining power by a league with the devil, but that such an alliance might be made unconsciously and that the power might be conferred upon an unwilling subject as a means of ruin to his soul. Several cases are described at length in which persons in whose hands the divining-rod pointed out springs, etc., had been, by prayer and fasting and the help of their spiritual advisers, delivered from this dangerous gift. The authorities of the church favored this view, at least so far as any moral uses of the divining-rod were concerned. In 1701, the Inquisition of Rome condemned the divining-rod and all writings in support of it.

I condense from M. Chevreul's book the following list of the principal authors on the subject, for the period now under consideration:

Dr. Chauvin, of Lyons (a letter to the Marquise de Senozan, dated September 22d, 1692, published in the brochure *Superstitions anciennes et modernes*, Amsterdam, 1733; also in an appendix to the second edition of Lebrun's *Histoire critique des Pratiques superstitieuses*).

Dr. Pierre Garnier, of Lyons (a letter to M. de Sève, published November 10th, 1692, at Lyons). This, like the letter of Dr. Chauvin, advanced the corpuscular hypothesis.

Two anonymous letters concerning the divining-rod, published in the *Mercure* of January and February, 1693. The first combats the corpuscular hypothesis; the second argues that, although this explanation is to be rejected, there is, nevertheless, nothing supernatural, magical, or diabolic about the phenomena, and they are probably to be referred to physical causes as yet unknown.

M. de Couriers, a blind man and thorough partisan of the divining-rod (a letter in the *Mercure* of March, 1693).

M. L. de Vallemont, priest and doctor of theology (*Physique occulte, ou Traité de la Baguette divinatoire et de son Utilité pour la découverte des Sources d'Eau, des Minières, des Trésors cachés, des Voleurs, et des Meurtriers fugitifs*, Paris, 1693, 12mo, 608 pages). The argument of this book has been summarized above. Its purpose was to diminish the category of "occult" things by showing that the phenomena of the rod, like those of magnetism and electricity, were explicable by the physical corpuscular hypothesis.

Two letters published in the *Mercure* for April, 1693, by order of the Prince de Condé. One is anonymous; the other is addressed by M. Robert, *procureur du roi*, to Father de Chevigny. These are the documents which record the failures of Aymar; and the second concludes as follows: "His Serene Highness desires the assurance to be given to undeceive the public that the rod of J. Aymar is nothing but an illusion and a chimerical invention. These are the prince's words."

Father Lebrun (*Lettres qui découvrent l'Illusion des Philosophes sur la Baguettes, et qui détruisent leurs Systèmes*, Paris, 1693; also *Histoire critique des Pratiques superstitieuses qui ont seduit les Peuples et embarrassé les Savants*, Rouen and Paris, 1702). These publications have been alluded to above. The letters comprise an interesting correspondence among Father Lebrun and three of the foremost *savants* of France, Father Malebranche, the Abbé de Rancé (the celebrated Abbé de la Trappe), and the Abbé Pirot, Chancellor of the University of Paris. Lebrun (writing before the Lyons murders) narrates the alleged powers and performances of the diviners of Dauphiny, and asks Malebranche what he thinks of the matter. The latter, reasoning acutely on the data offered, decides that, as to physical objects (for example, springs), if the action of the rod is real, water on the surface must agitate it more powerfully than water underground, also that it can not be possible by any natural law to distinguish between the action of a small spring near the surface and a larger spring lying deeper. As to moral effects (discovery of murderers, missing landmarks, etc.), he concludes that, if the rod really does this without fraud, it can only be from a supernatural cause (presumably demoniac), and that the use of the rod is therefore to be condemned. Lebrun rejoins, agreeing with this view as to the moral effects, but suggesting the corpuscular hypothesis as to material objects. A second letter of Malebranche declines to yield this point, and positively ascribes the whole thing to the devil. Meanwhile, the Abbé de la Trappe consulted by Malebranche, and (like the latter) assuming for the sake of the argument, but not accepting fully the reality of the phenomena, says the discovery of murders, etc., must be ascribed to Satan, but the physical effects may be the result of a physical cause. Nevertheless, the use of the divining-rod should be discouraged altogether on religious grounds. Chancellor Pirot takes the same position, saying that the curés should forbid this practice as unlawful.

In his *Histoire Critique*, Father Lebrun gives a large number of instances in which the divining-rod has failed. He cites the provost of the Isle of France, who testified that he had often employed experts with the rod, both to detect criminals and to discover springs, and had never found one in whose hands the instrument was not "often variable and very often false." He shows the fundamental contradiction between two schools of practitioners, one of which declared that touching the rod with the same substance as the hidden substance which was causing it to move would stop the motion; while the other declared that this proceeding argumented the motion. The conclusion of the argument is, that the phenomena of the rod (which Father Lebrun appears to believe are sometimes free from conscious imposture) are due to an intelligent cause of some kind, and that this cause must be satanic.

Father Ménestrier (*Indications de la Baguette pour découvrir les Sources d'Eau, les Métaux cachés, les Vols, les Bornes déplacées, les Assassinats*, etc., published at the end of the author's *Philosophie des Images énigmatiques*, Lyons, 1694). This author takes the same view as the preceding.

M. Baritel (*La Verge de Jacob, ou l'Art de trouver des Trésors*, 1693). The translation of this book by Thomas Welton has been already mentioned. The author appears to hold the corpuscular theory of the Abbé Vallemont, with the addition (which I do not find in any of the views of Vallemont's book), that he ascribes the capacity of different men in the use of the rod to the effect of the planets under which they were born, and defines this effect to consist in opening the pores of some more than others, and filling some more than others with "active particles," which, being crowded out through the aforesaid open pores by the intrusion of exterior particles (from springs, metals, murderers, stolen goods, boundary lines, etc.), powerfully affect the rod. Whoever has from his favorable stars both particles and pores galore, can discover with the rod any thing he reasonably seeks. But he who has "only plentitude of particles with closed pores," will be sensitive to certain things only, to wit, such as move him most strongly, because the particles emanating from them violently eject *his* interior particles in spite of his less abundantly perforated epidermis.

The condemnation expressed by so many ecclesiastical authorities and by the Inquisition (October 26th, 1701) undoubtedly checked the use of the divining-rod for moral purposes. At least, we hear little of such applications in the eighteenth century. But believers in the rod were still numerous, and practitioners abounded, particularly in Dauphiny. The discoveries of Galvani put into the hands of the crude science of the day the materials for a new hypothesis, which was first applied to the so-called hydroscopes or water-diviners. One of the most celebrated of these, Bartholemy Bleton, was born in Dauphiny in 1750, and in 1780 was called to Lorraine by Dr. Thouvenel, who wished to study a good specimen of this art. The doctor, like his predecessors a hundred years before, tried credulous experiments and asked questions in abundance, and obtained a mass of supposed facts, out of which he immediately made a book, published in 1781, and called *Mémoire physique et medicinal montrant des Rapports évidents entre les Phénomènes de la Baguette divinatoire du Magnetism et de l'Electricité*. It would be useless to give the voluminous details of his investigation. The following points are, however, especially noteworthy. In the first place, Bleton apparently did not profess to discover immaterial qualities or facts, but chiefly confined himself to the detection of running water. In the second place, he frankly avowed that the rod possessed no power in itself by virtue of its form or material, and that it was merely an index, outwardly exhibiting to the spectators his inward feeling. This feeling the doctor declared to be a tremor, attacking first the diaphragm and communicating itself through the body and hands to the rod. In the third place, this tremor was found by Dr. Thouvenel to be weakened, though not destroyed, when Bleton was on a tree or ladder or another person's shoulder, instead of the ground, or when he touched electrified substances; but the tremor and also the movement of the rod were completely stopped when Bleton was insulated from the ground. Upon facts of this kind he based his electrical theory. I remark, by the way, that the observations and the theory of Mr. Latimer, in his recent work on the divining-rod, already mentioned, recall in a striking manner the performances of Bleton and the theory of Thouvenel. Mr. Latimer claims to have made the new discovery that the effect of the divining-rod is destroyed by insulating the

practitioner, as, for instance, by placing him upon a platform supported by glass bottles. If he had known how thoroughly this claim had been examined and refuted, almost exactly one hundred years ago, he would have had less faith in its novelty and value.

Thouvenel's book made no little sensation, and in 1782 Bleton was called to Paris, where a remarkable series of experimental tests were applied to him. A newspaper report of the day declares that, in the presence of many thousands of spectators, he followed a subterranean aqueduct in the garden of the Luxembourg for fifteen thousand yards without a mistake. The chief-engineer of the water-works is reported to have said that the trace was so accurate that, if the maps of his office had been lost, Bleton's footsteps would have constituted a complete survey to replace them. It is just possible that the *Journal de Paris* was tempted to make a sensation of this case, and it is also quite possible that a keen observer might notice indications other than those of his own diaphragm, by which he could follow the line of buried pipes. A large number of experiments, more calmly reported, certainly do not sustain the enthusiasm of this account. It was found, for instance, that Bleton often passed over running water, when blindfold, without noticing it; and that when taken several times over the same course, he would not point out accurately each time the spots which he had previously marked. For example, of sixteen points once indicated, he recognized with the rod on the second round but eight, and missed the other eight. A single point to which he was repeatedly brought blindfold, he indicated three times and missed three times. Of seven channels of running water which he was made to cross repeatedly, he indicated one once in four times, another once in four times, and another once in three times, while still another, which he crossed in two spots, affected his diaphragm at one crossing, and not at all at the other. The insulation experiment was repeated by a physician at Paris. As a point where Bleton's rod was powerfully affected by alleged subterranean water, he was mounted upon a stool with glass legs, and immediately the rod ceased to be affected. When the stool was removed, however, and he stood upon the ground, the rod resumed its sensitiveness. But Dr. Charles, who conducted this experiment, took occasion, while Bleton stood upon the stool, to bring the top, without his knowledge, into electrical communication with the earth by means of a good conductor, thus destroying the insulation completely, though the hydroscopist supposed it still to exist. Under these circumstances, the rod remained inactive, and the destruction of insulation did not produce the slightest result. This was declared at the time to be a proof of Bleton's charlatanry: but, as we shall see hereafter, it is equally consistent with the hypothesis of unconscious mental and muscular action.

As a final test of Bleton's capacity as a hydroscopist, he was taken blindfold into the new church of St. Genevieve, where there was known to be no water for one hundred feet below the floor, the vaults, foundations, etc., actually extending all that distance below. Here he professed to discover at numerous points large and small streams of water. Thouvenel subsequently asserted that his *protegé* had been affected by currents of damp air circulating in the cellar; but this explanation was universally considered as a desperate attempt to maintain a theory already brought into discredit by experimental tests. Bleton, however, though he ceased to be seriously respected by impartial scientists, continued to receive much attention, and to do a thriving business, both in Paris and subsequently in the provinces. Here, however, he no longer worked blindfold, or professed to see with his diaphragm. He proceeded, like the ordinary water-diviners, with open eyes, studying all the natural indications, and coming to his decisions with abundant leisure; and under these circumstances it is beyond doubt that he rendered many valuable services to landed proprietors by successfully locating wells. In many cases, however, he failed entirely, and it is reported that, even in those in which he succeeded, he was seldom right as to the depth at which water would be found or the quantity which would be obtained. It should be mentioned that in Dauphiny, where Bleton discovered a large number of springs, he was regarded with an esteem never given to Aymar and some other famous hydroscopists. In other words, the people who knew most about the art of discovering water pronounced Bleton to be a real expert, while they believed Aymar and Parangue (of whom a word presently) to be more or less charlatans. A review of all the facts leaves little doubt that in Bleton's case there was an unusually large proportion of the skill of the prospector, combined with rather less than usual of the mysterious claims of the wizard.

Concerning Jean Jacques Parangue, mentioned above, it will be sufficient to say that he was born in 1760, near Marseilles, was said to have been peculiarly sensitive as a child to the presence of subterranean waters, and became famous as a hydroscopist; but he used no rod at all, and the scientific theory advanced by his friends was one of clairvoyance. His eyes was described as very peculiar, and it was asserted that he saw water through rocks, earth, or masonry, but, strangely enough, not through wood, crystal, or glass. Like Bleton, he often deceived himself as to the volume and depths of the springs he discovered.

Dr. Thouvenel never saw Parangue, but defended him against the incredulity of the physicists, and undertook to show that the phenomena of clairvoyance even was merely a case under his electrical theory. According to his explanation, the delicate nerves of the eyes were affected by the electrical currents traversing the body, and therefore the clairvoyant really experienced the sensation of vision by an internal, not an external excitation. Those who have read the admirable treatise of the late Dr. Clarke upon *Pseudopia* will notice with interest that in this case Dr. Thouvenel, explaining imaginary facts by an untenable hypothesis, nevertheless came very near a true physical theory of visions.

The worthy doctor emigrated at the time of the French revolution, and carried with him to Italy another Dauphinese hydroscope named Pennet, whom he exhibited from city to city in support of his electrical theory. Pennet professed to find with his rod not only water, but buried metals and coal. I will not go at any length into the experiments. Some of them were striking and successful, and impressed even such *savants* as Spallanzani, more or less predisposed to expect discoveries in the new domain of animal magnetism. In many other cases, however, the experiments failed. For instance, in a trial of three days, at Padua, before a commission of *savants*, Pennet promenaded for two hours on the first day in a garden in which had been buried at different points four metallic masses and a thousand pounds of coal. He could not find the metals at all, and only after much difficulty indicated the coal. On the second day, his ill success was equally marked. Finally, on the third day, of three metallic deposits, he failed to find the first, came pretty near the second without exactly hitting it, and found the third. The area covered by the search was only eight hundred and forty square feet. Upon this test, Spallanzani revoked his favorable opinion. But at Florence, as reported by M. Bilot (*Mélanges Scientifiques et Litteraires*, 1857, tome ii., p. 80), though I do not know on what authority, Pennet was so completely disgraced as to render worthless all evidence furnished by his career. A walled inclosure was prepared for experiment. It contained ninety small divisions, in five of which metals had been hidden. Dr. Thouvenel having discovered that wet weather hindered success, the experiment was delayed until after eight dry fine days, and it was then fixed for the following day. During the night which intervened, Pennet climbed by means of a ladder into the inclosure. A suspicious person who was watching the ground removed the ladder, and whatever the divining-rod could show, it was unable to show the prisoner the way out. This adventure, being made public, destroyed the credit of Pennet at Florence. Dr. Thouvenel could not deny the fatal fact, but, with true loyalty to science, declared that Pennet's moral defects had nothing to do with his physical faculty. It is only fair to add that no such passage as this is cited from Dr. Thouvenel's works.

(TO BE CONTINUED.)

SOME TESTS FOR THE EVAPORATION OF THE HORIZONTAL STEAM-BOILER

Prof. Henry Morton, of the Stevens Institute of Technology, Hoboken, N. J., has been making some tests for the evaporation of the horizontal steam-boiler, in order to ascertain what the efficiency is. His trials so far have demonstrated that the usually rated 50 horse-power horizontal boiler, with a heating surface of 850 square feet, and 24 feet grate surface, will be 9·25 pounds of water per hour with a bituminous coal containing 16 per cent of refuse matter, from the temperature of 212 degrees feed-water, with a rate of combustion of ten pounds of coal per square foot of grate surface per hour, or 11·04 pounds of water per pound of combustible, the temperature in the chimney being 375 degrees Fahr. The tests are not complete, and are to be carried on further, when a fuller report will be made. A very extended trial is to be had, which will include natural and forced draught and the various other circumstances under which the boiler may or might work.

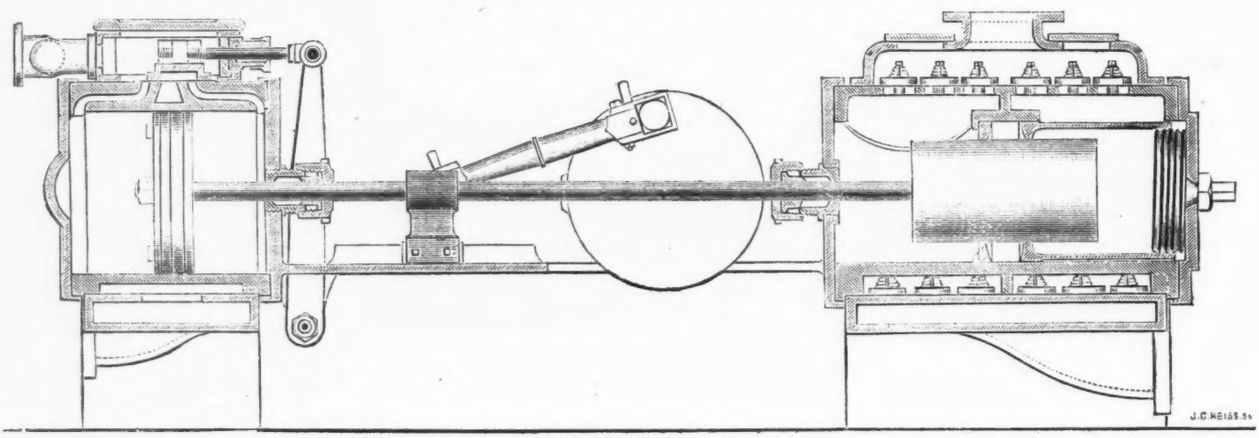
THE STRENGTH OF WIRE ROPES.

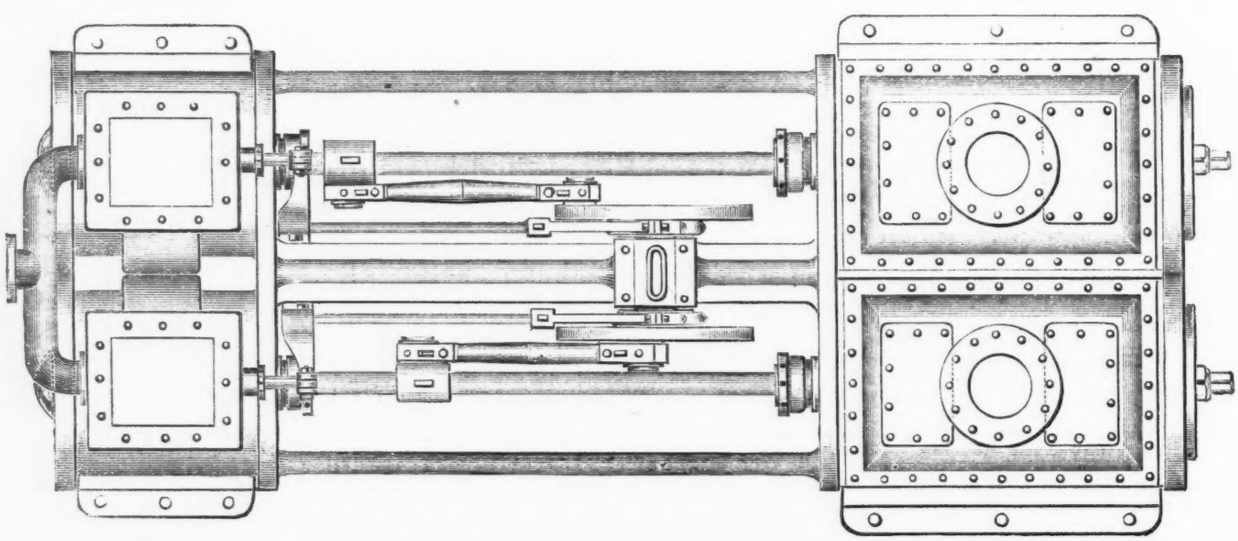
Winding-ropes when in use stretch from 4 to 1 per cent of their entire length, without impairing their strength. This usually takes place during the first six months of working; but while this lengthening process is going on, if the wires are not twisted to the same extent, considerably more strain will be put on some than others; therefore to mitigate this, the strands are wound around a central core of hemp, as ropes with wire *centers* have not given satisfactory results in practice, although a greater breaking strain is obtained with a relatively smaller rope. The same may be said of iron centers. These will not stretch and accommodate themselves to the elongated strands; consequently, the center is liable to break and spoil the rope. In the case of hemp centers, they stretch with the strands and also allow the wires to bed themselves with more solidity. To provide for the stretching of the ropes, large links are put between the detaching-hook and cap. These are kept in sets of 1, 2, 3, and 4, so that if the rope had stretched 1½ feet, and 4 links were in, these would be replaced by a set of two. When all the links have been removed in this way, then an additional coil will have to be put round the drum-shaft if the rope requires further shortening. Sometimes *strands* are made with eight or more wires wound around a hemp core, but are not recommended, except in the case of wet pits, with galvanized steel wires; in this way they have been found to answer very well, as they do not corrode. For ordinary work, experience demonstrates that ropes are best made with hemp *centers* only, which should be hard and well rounded up. Six strands of nineteen wires each make the most durable ropes. These work better than one composed of six or seven wires in a strand, as the latter, being larger and less pliable, are more likely to snap in bending around wheels and drums. When three of four of these large wires break near together, the rope is hardly fit for work, whereas the breakage of that number of small wires would be of little consequence. The small wires last a long time, as there is not much friction where large pulleys are used, and the inside wires are not affected by it at all. However large the wire may be, the least wear on the outer surface weakens it considerably. At the same time, a strand of seven wires, equal in size, is nearly perfect, each touching its neighbor, and also the center one. Six strands in a rope are better than four or five, as they make it rounder, and consequently the friction is better distributed.

A COKE-BURNING LOCOMOTIVE.—Several experienced Western mechanical engineers visited Philadelphia recently, to inspect the new locomotives of the Reading Railroad. One of these engines was prominently brought into notice by its performance on the Chicago, Burlington & Quincy Railroad during the Chicago Exhibition, and afterward on the Baltimore & Ohio Railroad. Particular interest attaches to the capacity of the locomotive to use coke for fuel, as that combustible, being entirely free from smoke, will not only at once relieve the Western companies from the penalties for infractions of the laws for the prevention of the smoke nuisance, but will secure greater comfort and pleasure to the traveling public. The tests of the locomotive demonstrated that continuous runs of two hundred miles can be made with coke fuel, without any further attention on the part of the fireman than simply feeding the furnace, and that meanwhile no clinker or other obstruction to the draught occurred during the trials, which were of a most exacting nature. The coke used was the product of the Connellsville Coke and Iron Company, and its chlorific efficiency was found to be in excess of seven pounds of water evaporated for each pound of coke consumed. At the request of the visiting experts, further evaporated tests of the same kind of fuel are to be made in one of these locomotives.

THE HENWOOD DOUBLE-ACTING PUMP.

As the result of twenty years' experience in the building of mine and quarry machinery, Messrs. Henwood, Whitaker & Co., of Philadelphia, have recently brought out a new design of double and direct-acting steam plunger pump which has a number of features of special merit. Our illustrations will aid in fully explaining their character and scope. With a view to overcoming the trouble and expense incident to the wearing of cylinders and metallic packing rings, especially when dirty or gritty water is handled, the pump proper is made as follows: The plunger has no metallic contact, but works through hemp or elastic packing in the internal stuffing-box shown in the accompanying vertical section. The packing may be compressed at will about the plunger by a movement of the cage, the back end of which screws upon a brass junk ring threaded on the outside. Fastened to the junk ring is a wrought-iron stem which passes through





the pump cylinder-head and ends in a square bolt. After loosening the lock-nut, a wrench may be applied, the junk ring be turned, and thus the cage with its annular end be forced forward, compressing the packing. We are informed that the packing will last from one to six months, according to the character of the water and the duty required, and then the replacing of three rings of hemp requires only ten minutes' time. The water-ways are large and direct, as will be seen, thus giving free passage to sand and mud. In a number of tests made under unfavorable circumstances, the pump discharged from 30 to 35 per cent of river sand.

The plain steam valves are made with the necessary lap to expand the steam from 15 to 40 per cent, so that to a great extent the advantages of compound pumps are secured, without sacrificing simplicity. The slide-valve is worked by a lever which gets its motion from the eccentric, which has one half the throw of the valve, thus giving an advantage in the smaller sizes of pumps, where the eccentric is placed on the circumference of the crank-wheel. The engines are geared at right angles, the cross-heads being attached directly to the connecting-rods and piston-rods and working on guides as shown in the drawing. Being a crank-pump, it has a positive motion and positive length of stroke through all variations of speed. The suction and steam exhaust pipes are placed beneath the pump, thus making every thing free and clear about the pump.

HIGH SPEED IN ENGINEERING.

Mr. Percy Westmacott, President of the British Institution of Mechanical Engineers, in his annual address before the recent Liége meeting, made the following interesting remarks: There is a proverb, "More haste, less speed," but this, though true of human labor, which ceases to be accurate when forced beyond a certain rate, does not hold good of mechanical processes. Generally, it may be said that rapidity of working not only reduces cost, but improves the result, and also confers great benefits from the way in which it brings out and perfects the highest qualities of the engineer. To be able to do a thing leisurely and quietly, simply requires the rudest materials and the rudest workmanship; but if the work is to be done quickly, or the appliances made to move quickly, the case alters. Mechanical energy increases as the square of the speed; and so it may be said that the mental energy and skill required to carry on work increase also at something like the square of the speed with which that work is performed. The materials used must be far stronger and far finer; every thing must be well proportioned and balanced; there must be the most perfect arrangement in each structure and in every part of a structure; the most perfect workmanship in the fitting of these parts together; and thus we may almost reverse the proverb, and say of mechanical processes, "The higher the speed, the better the work."

This view opens out so wide a field for contemplation that to traverse it even rapidly would require rather a volume than a paper. All that can be done at present is to give a very few obvious illustrations of the subject. Take, for instance, the steamship with her engines and accessories, more especially the modern ship of war. There is scarcely any structure which requires so much care and skill, both in its design and execution. Not only does it involve all the problems which occur in erecting steam machinery on land, but in addition the vessel has to contend against the heavy and uncertain strains due to wave action during the roughest weather. Hence all parts of the structure, and especially the engines and boilers, should be so designed and constructed, and the materials so selected, that their weight may be reduced to the lowest point. Every increment of speed attempted to be given is accompanied with complex questions of increasing difficulty, taxing the skill and power of the engineer to the uttermost. The development of the compound condensing engine, for instance, is largely due to the marine engineer, who was

driven by necessity to study most closely the economy of fuel, in order thereby to gain speed.

The torpedo-boat is an excellent example of the advance toward high speeds, and shows what can be accomplished by studying lightness and strength in combination. In running at 22¼ knots an hour, an engine with cylinders of 16-inch stroke will make 480 revolutions per minute, which gives 1280 feet per minute for piston speed; and it is remarked that engines running at that high rate work much more smoothly than at slower speeds, and that the difficulty of lubrication diminishes as the speed increases: doubtless the experiments on friction which are now conducting by this institution will throw light upon this subject.

An important experiment in high speed in light vessels, which will doubtless be watched with much interest, is now carrying out. Mr. Loftus Perkins is building a steel vessel with a screw at each end. She is 150 feet long; her boiler pressure will be about 800 pounds per square inch, and she has a four-cylinder compound condensing engine of 800 horse-power working on to a single crank, and making from 400 to 500 revolutions per minute. When this vessel is laden with 300 passengers, her total weight will not much exceed 150 tons. Should this experiment be successful, it will materially advance the solution of the problem, how to put the largest possible amount of propelling power into a vessel, and so to drive her at the highest possible speed.

Again, in touching upon speeds, the mind naturally reverts to railroad traveling. Here, however, it would seem as if, for the present, we had reached a maximum. It is surprising how soon the speed of the locomotive was brought up to something approaching its present limit. George Stephenson was laughed at in 1825 for maintaining that trains would be drawn by a locomotive at twelve miles an hour; but the Rocket herself attained a speed of twenty-nine miles an hour at the Rainhill competition, in 1829, and long afterward ran four miles in four and a half minutes. In 1834, the average speed of trains on the Liverpool & Manchester Railroad was twenty miles an hour. But by 1840, there were engines on the Great Western Railroad capable of running fifty miles an hour with a train, and eighty miles an hour without. In 1841, we find Stephenson himself ranged on the side of caution, and suggesting that forty miles an hour should be the highest regular speed for trains. Now, it is a remarkable fact that the highest speed at which locomotives run in ordinary practice scarcely seems to have been raised during the last twenty-five years; on the other hand, the weight of the trains has been perhaps doubled. Although the average running time of express trains has in many cases been improved, this has been almost entirely due to their making fewer stoppages. At the same time, the speed occasionally attained is very great. Engines on some of our principal lines have repeatedly run fifteen miles in twelve minutes, or at a speed of seventy-five miles an hour, and express trains run regularly at fifty-three miles an hour. It does not follow, however, that there is never to be any increase in the speed of trains, and it seems a point well worth consideration in what way the time of transit between important centers of trade can be shortened.

What are the causes which have tended to prevent any improvement in this particular? In the first place, it may be said that the permanent way would suffer seriously by further increase in speed; but this could surely be overcome in time by improving the permanent way itself, which also remains very much in the same condition and of the same construction as it was twenty-five years ago. Again, it may be said that the running at a higher speed would require more powerful engines, and hence that trains now worked by a single engine would require two, or would have to be split up into two trains, at a great increase in running expenses. This, however, assumes that it is not possible so to improve the engine that it shall be able to exert a considerably higher power without an inadmissible increase in weight. By utilizing a larger part of the total weight of the engine as adhesion weight, it would be easy to obtain the amount of adhesion required for the increased tractive force; and for this purpose Mr. Webb's compound locomotive (to be described by the author in a paper he has prepared for this meeting), which enables the number of driving-wheels to be increased without the use of coupling-rods, appears to merit particular attention.

Another point in which improvement may possibly arise in the future should be noticed. On the Russian railroads, where both coal and wood are dear, the burning of petroleum has now taken a practical form. Our member, Mr. Thomas Urquhart, has been very successful in this direction, and is now running locomotives regularly which use only petroleum refuse, and which show a marked economy over coal or wood. To test the point, he prepared three locomotives of exactly the same type, and started them on successive days under exactly similar conditions of weather, train, and section of road. The trips were made both ways, and the results per verst, including fuel required in lighting up, were as follows:

Anthracite, 52·9 Russian pounds, cost	26·35 copecks.
Wood, 0·0107 cubic sashin, cost	23·54 "
Petroleum refuse, 27·36 Russian pounds, cost	11·64 "

There is thus in this instance an economy of at least 50 per cent on the side of petroleum, the boiler pressure being from 120 pounds to 130 pounds, and the gross load over 400 tons. At the same time, the weight of fuel used, as against coal, is diminished by about 50 per cent, which is a most important item.

Although petroleum is scarcely a product of Western Europe, we have to notice on the other hand the progress which has lately been made in the extraction of oil as a waste product from coal, etc. Mr. Jameson has extracted as much as nine gallons per ton from mere shale. It is suggested that markets for such oil will be difficult to find; but it seems allowable to hazard the idea that we may hereafter see our locomotives, even in England, running with oil fuel, which would be at once much lighter and much more easily renewed than the coal which is used at present, and get rid of the intolerable nuisance of smoke and dirt. There might, in fact, be an oil-tank and a water-tank side by side at every stopping station, and the engine would replenish her store of fuel at the same time as her store of water.

For a special case, where speed is not only a means of doing work well, but an indispensable condition of doing the work at all, we may take the construction of long tunnels. As to this, we have the advantage of two very valuable papers on the St. Gothard Railroad, prepared by Herr Wendelstein, of Lucerne, one of them already published in our Proceedings, the other to be read at the present meeting. The piercing of a tunnel nine miles in length through the main chain of the Alps would be a financial if not a physical impossibility, but for the enormously increased speed of working which has been offered us by the invention of dynamite on the one hand and of rock-drilling machines on the other. As a result, we find that the St. Gothard Tunnel, nine miles long, was completed in nine years; while the Arlberg Tunnel, begun with the advantage of the St. Gothard experience, will be completed, it is confidently expected, at a rate 50 per cent quicker. As regards the driving of the leading heading (the crucial point in tunnel work), the rate at the Laveno Tunnel is stated to have reached 19 feet per diem. Even in the hard granite of the Pfaffensprüng on the St. Gothard, the rate of advance, with the Brandt hydraulic drill, reached a maximum in May, 1880, of 13 feet per diem. At the Arlberg Tunnel, I believe that still better results have since been attained with the same machine.

HISTORY OF THE IRON INDUSTRY IN THE LIEGE DISTRICT, BELGIUM.

By M. Edouard de Laveleye, of Liege.*

It is difficult to say exactly how the art of working iron originated in those provinces of ancient Belgium, which have since become known as the district of Liége. It is certain that Asia was the cradle of iron working, and it is possible that the Eburones and the Nervii, the ancestors of the present Belgians, brought with them from the Euxine, where they had their origin, secrets which had been already known for ages in that district. However this may be, it is almost certain that, when Cæsar arrived in Gaul, he found among the tribes he subjugated a knowledge of the art of transforming the ores of iron into a metal which they used for different purposes, especially that of arms. The discovery, in 1870, of ancient furnaces, still filled with materials, at Lustin, near Namur, enables us to understand the primitive method employed for the manufacture of iron. The furnace consisted of a single excavation in the ground, oval in form and rounded at the bottom; it was about twelve feet long by nine feet wide and three feet deep, and was formed in a bed of clay; a channel pierced through the clay allowed air to enter the bottom of the furnace. In this hollow was found the metal, which contained 93·48 per cent of iron, 0·37 of carbon, 4·94 of fusible materials, and 1·21 of sulphur and phosphorus. It is probable that the Romans communicated to the ancient Belgians the use of the bellows, which had long been known to them; and that other improvements were made during their rule in the art of treating iron ores. The invasion of the German tribes probably stopped the impulse given by the Romans to the manufacture of iron. In the eighth century, under Charlemagne, appeared the furnace called the *borneau à masse*, or Stückofen, which was higher than the old furnaces, and thus allowed a greater concentration of heat. Between the eighth and the twelfth century, the iron trade developed considerably, and the metallurgist Karsten cites the Low Countries as the district where the manufacture of iron at that period had reached its highest perfection. From thence to the fifteenth century, the progress realized was small. In 1468, moreover, the iron-works of the Liége District were almost entirely destroyed by the troops of the Duke of Burgundy. It should be remarked that up to this time malleable iron was almost the only product; but Karsten who has been cited above, observes that the first apparatus for producing cast-iron was established in the Low Countries, whence the art extended into Sweden and England. The oldest blast-furnace appears to have been constructed near Namur, in 1340. It is, at any rate, certain that before 1400 the foundry pig blast-furnaces of Les Vennes and Grivegnée, near Liége, were well known. During the succeeding three centuries, the number of blast-furnaces grew so rapidly that in 1700 an edict of the Prince-Bishop of Liége forbade the erection of any new furnaces for the next twenty-five years. The use of coke as fuel for blast, was introduced from England at a relatively recent period. In 1769, an attempt to smelt iron ores by means of coke was made at Juslenville, near Spa, but without success. On the other hand, wood becoming scarce, raw coal had been used for the finishing of malleable iron as early as 1627; but its employment in the process of transforming cast-iron into malleable iron was also of foreign importation. This process became common in England while it was still unknown in Belgium. It was in 1784 that Cort and Partnell invented in England the puddling-furnace and grooved rolls. Those improvements were introduced into Belgium, but the French revolution shortly afterward put an end to all progress in industrial arts, and the works of the Liége District were in great measure reduced to a condition so deplorable that it was necessary to close them. There was, however, no long intermission of activity. In 1800, circular blast-furnaces were found to be replacing the octagonal furnace hitherto in use. Their hight was at the same time raised from 15 feet to 25 feet. In 1803, the casting of cannon was commenced at Liége, and soon became the largest industry of the province. The idea, however, was still general that the coal of Liége was not fit for making coke, and it was not until 1823 that an Englishman, whose name has become celebrated—John Cockerill—erected at Seraing the first blast-furnace, using coke as its fuel. This furnace remained unique of its kind until 1830; it was the origin of the works of the Cockerill Company, one of the most important on the continent. About the same time—in 1821—Michael Orban erected at Grivegnée the first puddling-furnace and the first rolling-mill on the English pattern. After 1830, the iron trade of Liége made a sudden start under the double influence of the introduction of railroads and the inauguration of large financial companies. In 1839, and afterward in 1848, serious crises occurred in the trade; but these reverses were succeeded on both occasions by new advances in prosperity. Hitherto, the only ores treated in Belgium had been those from the district of the Ourthe and that between the Sambre and the Meuse. These ores are now almost exhausted down to the level from which water could be pumped to give a profit, and the iron trade of Belgium could not have continued had not new raw material been brought into use. There exists in the Devonian formation an important bed of oligiste or specular ore, of an oolitic character; but for a long time this mineral was considered impossible to reduce. In 1853, however, the blast-furnaces of Ougrée produced a revolution in the Belgian iron trade

* Institution of Mechanical Engineers.

by succeeding in the utilization of these ores, and the trade then entered upon a new series of prosperous years. We may now proceed to the improvements introduced into blast-furnace working. In 1803, the bellows, which had been in use from the earliest times, began to be replaced by blowing-engines with metallic pistons; and in 1837, the Cockerill Works took the initiative in introducing the hot blast. It was the same works which introduced into Belgium the making of Bessemer steel. The first converters were erected in 1863. It is probable that the discovery of the cementation process for the making of steel had its origin in Liége. At the beginning of the seventeenth century, in 1613, a permission to convert iron into steel is found to have been officially accorded to two armorers of Maestricht, a town which then belonged to the province of Liége. Karsten is, therefore, right in saying, "England, which has now become the school of iron metallurgy, owes to the continent"—in fact, as we have said, to the district of Liége—"two great discoveries, namely, that of the blast-furnace and that of cemented steel." Our notice of the iron trade may be concluded by some details as to its situation at the present time. The discovery of the means of reducing the specular iron ores, at the time when the old ores were exhausted, saved the district from ruin. At this moment, however, the former ores in their turn are nearly exhausted, and the blast-furnaces are almost exclusively supplied, as far as pig-iron for puddling is concerned, from ores raised in the Grand-Duchy of Luxembourg, and, so far as steel pig is concerned, from ores raised in Spain. Thus, during the year 1882, the blast-furnaces consumed 394,405 tons of foreign ores, of which 182,842 tons came from Luxembourg, and 152,023 tons from Spain and Algeria. On the other hand, only 82,612 tons were indigenous ores. As a set-off to this disadvantage, the Belgian works are placed in the center of a district producing coke, which is cheap and of good quality. They are in a country where prices are in general favorable, where labor is abundant, and where workmen are skillful. The ores of Luxembourg are relatively poor in iron, and contain a good deal of phosphorus; but they fuse with great rapidity, inasmuch as they frequently contain a flux within themselves. They have gradually modified the nature of the Belgian trade. A restricted make, of superior quality, has given place to a largely increased make, but no longer of so high a character. The tendency at this moment is, however, to place the blast-furnaces in the localities where ore is raised, and the works for finishing the iron at the centers of the production of the fuel. It is found more economical to carry over the same distance a ton of coke and a ton of pig than to carry three tons of ore and flux. This has produced a displacement of the pig-iron industry, which has been transferred in part to the southern part of the Luxembourg province, in the neighborhood of the mines. On the whole, the Belgian iron trade has thus received a fresh advance, in place of declining, as a consequence of the exhaustion of its native ores. In spite of all the disadvantages which weigh on the country, the care given to every detail, and the application of strict economy even in the smallest points, have preserved to Belgium her place in the metallurgic world, and enabled her to contend successfully against the most powerful competitors. A few figures will be enough to show the progress which has taken place. It is known that the low hearths formerly in use produced in 1546 about 300 kilograms of iron—6 cwt.—in twenty-four hours. At the end of the sixteenth century, the blast-furnace then in use produced about three tons per day. At the end of the eighteenth century, it remained almost the same. A furnace at Chimay produced about 720 tons per annum. For any very great advance upon this, we must go forward to the coke-furnace erected at Seraing by John Cockerill in 1823. This furnace produced about 10 tons in the twenty-four hours. About 1840, furnaces of a new type, erected about the same time in the Cockerill Works and in those of Espérance and of Grivegnée, regularly produced 14 tons of foundry pig or 20 tons of refinery pig per day. In 1848, 24 tons were considered a good average make per day; and in 1860, the Grivegnée furnaces, which gave the best results in production, did not run more than than 9000 tons of pig per annum, or about 25 tons per day. The make has now very largely increased. The Seraing furnaces produce from 65 to 68 tons of Bessemer pig per day, while at Ougrée, two furnaces produced altogether in 1882 more than 41,000 tons. In making pig-iron for ordinary puddling, a make of more than 90 tons per day has been attained. The blast-furnaces at Esch, on the Alzette, in the Grand-Duchy of Luxembourg, produce as much as 110 tons per day. As to wrought-iron, it is difficult to give exact figures. The skill of the workman is a main element in the quantity produced; and the improvements effected by the substitution of coal for wood have had a large influence on the price, without greatly changing the capacity of production. The attempts to puddle by machinery have had little success, and progress has been realized chiefly in the economy of fuel by means of gas-furnaces, especially the Bicheroux furnace. Whereas formerly about one ton of coal was required for every ton of puddled bar produced, 550 kilograms (11 cwt.) are now sufficient. As regards steel, we shall only consider the steel produced by the converter process. The first Bessemer converters, erected at Seraing in 1863, gave from 10 to 12 tons of steel per day. At present, each pair of converters may be reckoned on to give from 150 to 160 tons in the twenty-four hours; and on the new American system, 340 and even 360 tons have been obtained. As a matter of statistics, the annual production of the works in the province of Liége was estimated in 1829 at 7078 tons of pig-iron, 660 tons of castings, 5011 tons of wrought-iron, and 4778 tons of iron manufactured for various purposes. The manufacturing works employed 711 workmen. In 1850, the make of pig-iron had risen to 65,393 tons, that of castings to 7688 tons, that of wrought-iron to 23,252 tons, and, lastly, that of manufactured iron to 7093 tons. In 1882, we find that the province of Liége contained 13 blast-furnaces actually in blast, and employing 1215 workmen. The make of pig-iron was 238,968 tons. The production of wrought-iron and manufactured iron was 126,461 tons, and occupied 5180 workmen. Lastly, the steel-works contained 9 converters, produced 171,937 tons, and occupied 2747 workmen. The average wages of the workmen employed at the blast-furnace is 3 francs per day; those employed at works for making or for working up wrought-iron get an average of 3·46 francs per day; while those employed at the steel-works, properly so called, have on an average 3·58 francs per day. These works, on the whole, have been actuated by 473 engines of various kinds, giving a total of 14,688 horse-power.

CHEAP COAL.

There is hardly an important industry in the cost sheets of which fuel does not constitute an important item, directly and indirectly. During periods of depression like the one through which we are now struggling, every factor is closely scanned by the producer, adversity teaching many methods of economy which prosperity slighted. Improved construction of boiler furnaces and the highest class of modern engines are carefully studied with the view of carrying down the coal bills. Consumers have become very close buyers, and many of them have frequent occasion to rejoice over their success in getting cheap supplies of fuel. Undoubtedly, low figures often tempt them to disregard true economy and sacrifice quality to quantity; but on the whole, there are many evidences that consumers have learnt a good deal during the past year which they are not likely to forget. The question frequently comes up whether it is or is not probable that the benefits of cheap bituminous coal, which consumers throughout the country are now enjoying, are likely to outlast the present period of dullness.

A comparison of the quotations of bituminous coal from a variety of sources in the leading markets will show what point we have reached, and will form the basis upon which a further discussion may take place:

New York.

	Jan. 1, 1882.	July 1, 1882.	Jan. 1, 1883.	July 1, 1883.
Cumberland	$5.00	....	$4.65	$4.00
Clearfield	5.00	$4.20	4.60	3.75

Boston.

Cumberland	....	....	5.45	4.50
Clearfield	....	4.90	5.50	4.45

Philadelphia.

Cumberland	3.60	....	3.30	3.15
Clearfield	3.60	3.45	3.30	3.10

Pittsburg.

Pittsburg, lump	4c. per bush.	5¾c.	....	5c.
Coke at oven	$1.65	$1.50	$1.30	90c.

Cincinnati.

Youghiogheny, 2d pool	10c. per bush.	8c.	8½c.	7¾c.
Kanawha	9c. "	7c.	7c.	6½c.
Ohio River	7c. "	6c.	6c.	5½c.

New Orleans.

Pittsburg coal	36c. per bush.	28c.	35c.	30c.

Cleveland.

Brier Hill	....	....	$3.45	$3.25
Massillon	....	....	2.75	2.60
Tuscarawas	....	....	2.25	2.15

Chicago.

Indiana Block	$4.00	$3.25	$3.40	$2.85
Hocking Valley	5.00	4.00	4.00	3.25
Wilmington	3.50	2.75	3.00	2.50

The principal causes of the low figures quoted above are a very great increase in the output and capacity of our mines, a very rapid extension of the railroad system directly tributary to the coal traffic and indirectly affording it increased facilities to leading points; and a general scaling down of wages. Taking up these points in their order, so far as they affect not alone an absolute but also a relative decline in the prices of bituminous coal, we may first note the evidences of a striking growth in the output and capacity of the mines. As to their production, we need only point to the eloquent fact that our mines yielded about fifty-eight million tons of bituminous coal in 1882. We have not, unfortunately, comparative figures on the growth of the capacity of the same mines; but the very fact that the mines were busy during the census year, while, generally speaking, they were working only three-quarter time or less last year, proves that in all likelihood their capacity has grown in even a much greater ratio. Competition, not alone among the producers of our region, but also among regions which have only of late come into conflict, will therefore tend to keep prices low, as no scarcity need be feared.

The extension of our railroad system during the past few years has been phenomenal, and, save the development of the system opening out the Western agricultural regions, the railroads distinctively called "coal roads" have multiplied more than any other. Coal is recognized among railroad managers as one of the best-paying classes of freight, and aside from this fact, the tempting opportunities for the acquirement of wealth by individuals having close relations with the railroads may have contributed much toward stimulating this class of enterprise. Pennsylvania has seen the starting of the Vanderbilt lines southward, through almost a continuous belt of coal territory. A number of rival lines are approaching to tap the Clearfield region; the Rochester & Pittsburg has begun shipments from new territory; the Pennsylvania, Baltimore & Ohio, and Vanderbilt roads are struggling for supremacy in the Connellsville coke district; and a number of minor enterprises are opening out smaller fields. In Virginia and West Virginia, the Chesapeake & Ohio, the Pittsburg & West Virginia Central, and the Norfolk & Western have entered districts in which great mineral treasures lie dormant. In Alabama and Tennessee, coal mining has had a strong and undoubtedly lasting impetus. In Ohio, Indiana, Illinois, and other Western States competitive lines are multiplying, and in the far West the building of a large number of new roads has fairly started an industry that is capable of great development. Almost as great an influence upon the prices of coal and the variety of sources available to the markets has been exercised by the building of railroads not primarily intended to develop coal territory. It has created and fostered a competition which has not only run down freight rates, but has also placed a formidable rival to interior and ocean navigation. A survey of the situation, cursory though it may be, will, we believe, convince the unbiased observer that there is no probability of a heavy increase in the cost of carriage.

The only factor which is liable to perhaps a strong upward movement is that of labor, which is undoubtedly now low. This, however, will probably be counterbalanced by a wider use of labor-saving devices both in mining and in handling the coal. There may therefore be, in times of greater activity, an upward movement in prices: but we do not look for any relative increase.—*Coal.*

AN ELECTRICAL LAUNCH.

A launch propelled by electricity was shown on the Thames on several occasions last year, and attracted a good deal of attention. It was propelled by a screw driven by a Siemens motor and Sellon-Volckmar accumulators. To a certain extent, the experiment was successful. Recently Messrs. Yarrow & Co., of the Isle of Dogs, took the matter up, and, working with the Electrical Power and Storage Company, a very handsome launch has been fitted up, intended for the Vienna Exhibition, with which many experiments have been made. On Tuesday, this little boat made a run from the Temple Pier to Greenwich in thirty-seven minutes, with a moderate tide. Some delay was, moreover, caused by the propeller fouling a basket, an event well known to every one who has had any experience with steam launches on the Thames. The distance is six miles, so that, making allowance for the tide, it may be said that a speed of over seven miles an hour was attained, and full power was not employed save for a portion of the time. On the measured mile, an average speed of over eight miles an hour has been obtained.

The boat is 40 feet long and of good beam. She had twenty-one persons on board, including the steersman and a man to look after the machinery, if such it may be called. The boat is completely unencumbered from end to end, no trace of the propelling mechanism being visible. This consists of eighty cells of Sellon-Volckmar accumulators, of which fourteen are disposed under the seats, seven at each side, and the remainder in the bottom of the boat under the floor. The screw is turned by an A Siemens dynamo commutated as a motor. No gearing is used, the spindle of the armature being coupled directly on to the end of the screw-shaft. The thrust-block is just aft of the dynamo, which is placed under the floor in the stern-sheets. It lies flat and occupies very little space. There are four brushes, two for going ahead, two for going astern, and two small lines going to a becket beside the steersman enable him at a moment's notice, by pulling one or the other, to go ahead or astern; a cylindrical switch beside him enables him to stop or go on at pleasure. This switch is graduated so that the current from forty, sixty, or eighty cells can be used at pleasure. The weight of the whole—batteries and dynamo—is about two tons, or as nearly as possible that of engine, boiler with water, and coal for a steam-engine competent to propel her at the same speed.

This pretty launch is the very perfection of a pleasure-boat; no heat, no smoke, no dust, no steam, no smell of oil, no splashing of pumps. There is no noise of any kind to be heard save the bubbling of the water from the propeller, and the faint hiss caused by the commutator rubbing against the brushes. There is no smell and no "blacks;" and the boat will run for six hours continuously, or about forty-five miles.

During the trip to which we are referring, the current passed through the dynamo was 41·22 ampères from sixty cells, the electro-motive force being 112·5 volts, and $\frac{41{\cdot}22 \times 112{\cdot}5}{746} = 6{\cdot}21$-horse power. The loss by friction, etc., must be very small; for six indicated horse-power could certainly not have propelled the boat at the speed she readily attained. It has long been known that the screw is an extremely wasteful propeller. It may be that further investigations will show that the screw is not so much to blame as the combination of screw and engines. At any rate, the system of electrical propulsion opens up a new field of inquiry, because it renders possible the use of screws of extremely fine pitch revolving at a great speed. The dynamo in Mr. Yarrow's boat makes about 680 revolutions per minute. The propeller is of steel, two-bladed, 19-inch diameter, and 13-inch pitch. There is absolutely no vibration, and very little disturbance of the water in the wake of the boat.

No matter what may be the opinions formed concerning the utility of the electrical propeller for commercial purposes, there can be no doubt that the Electrical Power and Storage Company and its manager, Mr. Collett, and Mr. Yarrow, have together proved that the system is admirably adapted for pleasure purposes. In fact, for such work as that now done by steam launches on the Thames, the electrical system is simply perfection. The expense will be, on the whole, about that of steam; but to those who keep steam launches, expense is a secondary consideration, and it must not be forgotten that a 20-foot electrical launch will afford at least as much accommodation as a 30-foot steam launch. Thus, in Mr. Yarrow's boat, quite 11 feet of the best part of her would be occupied by engines and boilers. As to the supply of storage-cells, that can easily be managed. Many private gentlemen could keep their own engine and dynamo on shore to do the charging, and for the rest it would suffice to establish at certain places on the banks of the river, as at Kingstone, Staines, Maidenhead, etc., depots where, during the summer season, dynamos driven by stationary engines would keep on charging batteries. By calling at any of these stations, enough power for a six hours' run could be obtained either by charging the cells in the boat directly, or by taking the run-down cells out and replacing them with charged cells.

We may add that certain very important improvements have been made in the Sellon-Volckmar accumulator, concerning which we shall have more to say. As now made, they have an E.M.F. of 2·3 volts per cell at starting, and will give five ampère hours per pound of battery—a very admirable result.

A NEW FOUNDRY-PATTERN VARNISH.—A varnish has been patented in Germany for foundry patterns and machinery, which it is claimed—we do not know how justly—dries as soon as put on, gives the patterns a smooth surface, thus insuring an easy slip out of the mold, and which prevents the pattern from warping, shrinking, or swelling, as it is quite impervious to moisture. This varnish is prepared in the following manner: 30 pounds of shellac, 10 pounds of Manila copal, and 10 pounds of Zanzibar copal are placed in a vessel, which is heated externally by steam, and stirred during from four to six hours, after which 150 parts of the finest potato spirit are added, and the whole heated during four hours to 87 degrees C. This liquid is dyed by the addition of orange color, and can then be used for painting the patterns. When used for painting and glazing machinery, it consists of 35 pounds of shellac, 5 pounds of Manila copal, 10 pounds of Zanzibar copal, and 150 pounds of spirit.

A NEW EXPLOSIVE.—Herr Koppel has devised a new explosive substance, which he expects to be less costly than any other, to give out no injurious fumes, and not to be liable to explosion by shock or friction. The following figures give the composition of two kinds, the first of each pair of figures relating to explosives suitable for hard rocks, such as basalt, and the second pair for softer, such as sandstone:

	No. 1.	No. 2.
Saltpeter	35·00	42·00
Soda	19·00	22·00
Sulphur	11·00	12·50
Sawdust	9·50	10·00
Chlorate of potash	9·50	.....
Charcoal	6·00	7·00
Sulphate of soda	4·25	5·00
Prussiate of potash	2·25	.....
Refined sugar	2·25	.....
Picric acid	1·25	1·50
	100·00	100·00

UTILIZATION OF COKE-DUST.—The Chief-Engineer of the Lyons Gas Company, M. Craponne, works up the coke-dust produced at the Perache Gas-Works into briquettes or patent fuel. The coke-dust is first mixed dry with pulverized pitch, and the mixture, raised by an elevator, is subjected to the action of a jet of steam, at from 45 to 75 pounds pressure per square inch, which melts the pitch. The pasty mass is then compressed into briquettes in the Durand and Marais machine, made by Dupuy & Co., of London and Paris. One of the greatest difficulties was found to be the grinding effects of the particles of coke, which acted like emery-powder on the metallic surfaces of the press, and rapidly wore them out. Various parts were accordingly made of chilled cast-iron, from 15 to 20 horse-power being required for driving. At first, the dust was ground, but this has now been found unnecessary. A previous washing is, however, found advisable, which operation reduces the percentage of ash to from 10 to 12 per cent. The briquettes, weighing rather over two pounds each, serve for firing the retort furnaces, being mixed with coke in the proportion of 40 and even 65 per cent of the quantity originally consumed. Some of the briquettes are also sold to iron-masters, for use in the blast-furnace. A ton of this fuel costs rather over 16 francs = 12s. 9d. to produce, or 17 francs = 13s. 9d., including interest on capital and depreciation. The complete works and plant cost 45,000 francs.

INSULATING SUBSTANCES.—M. Eric Gerard, the Belgian telegraphic engineer, professor of applied electricity at the Liége Mining School, has recently published a treatise on the insulating substances used in the various applications of electricity. He remarks that glass may be called the classical insulator, but its fragile and hygrometric properties are to a certain extent inconvenient. Porcelain he considers an excellent substance, its slight porosity being corrected by the process of enameling. He urges the necessity of keeping insulators well cleaned, as dust is capable of impairing their properties. Horn, bone, and ivory are often used in delicate telegraphic appliances; but M. Gerard does not recommend their adoption, as they contain in various proportions organic substances liable to decomposition. Wood has the disadvantage of being hygrometric. He considers ebonite as more suitable for use in instruments of precision than the foregoing substances. Silk is in itself a suitable material; but it is recommended not to employ that substance when dyed in the salts of copper or iron—as is usually the case with green shades—because it thereby acquires a certain amount of conductibility. Gutta-percha and India rubber are well known in connection with the purposes indicated; but M. Gerard gives special prominence to a combination of the latter with a large proportion of sulphur in the form of ebonite. He, however, remarks that it is, after a certain length of time, affected by the oxygen in the air, with which the sulphur unites, the surface of the ebonite becoming greenish and dull. Among various other systems which have been tried for cables, that of Brooks is referred to, which includes an iron tube containing the conductors simply covered with cotton and soaked in petroleum. A Swiss firm of electrical engineers, Messrs. Berthond, Borel & Co., is said to have resolved in the following manner the questions affecting the use of paraffine. The conductors are covered with a wrapping of cotton, and are made into a cable which is plunged into boiling paraffine. The cable subsequently passes through an appliance which gives it successively one layer of resin and two coverings of lead separated by a layer of bitumen. It is said that the electrical properties of such a cable differ but little from those of cables with gutta-percha covering, while its price is notably lower. It is further remarked that for industrial purposes it is not generally necessary to have perfect insulation, but rather to employ such insulating substances as are but little affected by air and heat.

FURNACE, MILL, AND FACTORY.

The Calumet Iron and Steel Company, Chicago, has executed a mortgage for $300,000 on what are known as the J. B. Brown Iron-Works, to A. J. Ives. It is understood to be for the purpose of clearing up outstanding accounts.

S. B. Whitney, of Pottsville, has been appointed General Superintendent of the Lehigh & Wilkes-Barre Coal Company. He is the successor of Charles Parrish, of the Wyoming and Audenreid Division.

The Scranton Steel Company is at present rolling rails which weigh seventy pounds to the yard and 120 feet in length. The four finished rails, after sawing, weigh 2800 pounds. The company, running only single turn, recently made 1008 tons of rails. It has been compelled to double the capacity of its rail-shed and has now four rail-straightening presses in constant use. It is also connecting the mill with the converting department, thereby lengthening the mill about 60 feet and making it 800 feet long.

Representatives from the firm of Edwin P. Allis & Co., of Milwaukee, the successful bidders for the contract for putting up the new pumping machines for the Alleghany water-works, arrived in Pittsburg recently, and engaged in consultation with Superintendent Armstrong about the manner in which to proceed with the work.

A test that proved successful was made recently in Philadelphia of the Ellithorpe patent air-brake and patent air-cushion connected with the elevators in the new building of the Liverpool, London & Globe Insurance Company. The car was weighted with iron rope, and, when disconnected from the hoisting apparatus, fell with great rapidity; but upon the application of the brakes, its descent was instantly checked, the distance traveled from the time of applying the brakes to its actual stoppage being only six inches. In spite of the sudden arrest of the movement of the car, there was no jarring. In testing the air-cushion, the car was allowed to drop from the top story to the bottom, a distance

of about 70 feet. As it reached the ground, the compressed air broke the fall, and the car landed easily and safely. Among those present who witnessed the tests were Messrs. Albert Foster and J. E. Wootten, of the Reading Railroad Company; John Price Wetherill, of the Pennsylvania Railroad Company; Mr. McDowell, of the Shenandoah Valley Railroad Company; A. Atwood Smith, B. S. Janney, and B. W. Andrews.

There is a rumor that Stanhope furnace No. 2, Stanhope, N. J., will have to be blown out for repairs.

Rhodes & Bradley, iron merchants, Chicago, obtained a judgment for $82,422 against the Cleveland Rolling-Mill Company, in the United States Circuit Court July 28th. Judge Drummond delivered the decision. In 1879, the Cleveland mill made a contract with Rhodes & Bradley for the delivery of 8000 tons of pig-iron during the next year at $45 per ton. There were 3421 tons delivered on this contract, when, in March, 1880, the price of iron having greatly fallen, notice was served on Rhodes & Bradley that no more iron would be accepted at that price. The iron firm then made tender of the other 4579 tons, which was refused, and began the suit for damages on the contract. The court decided that they were entitled to the difference between the contract price, $45 a ton, and the market price in March, 1880, which was $27 a ton. This amounted to $18 a ton, or $82,422 on the rejected amount. A motion was entered for a new trial, and the amount of the defendants' bond was fixed at $120,000.

On the afternoon of July 24th, Alice Furnace No. 2, at Birmingham, Ala., was blown in. Alice No. 2 is the largest furnace in the State, and there is only one larger in the South—the Victoria furnace, in Virginia. The stack is 75 feet high, with a bosh of 18 feet. It has eight tuyeres and eight iron columns, 21 feet high; Witherow & Gordon's latest improved patent adjustable tuyere stocks; four cooling-plates in the bosh above the tuyeres, with a water-breast below. The bell is lifted and lowered by a special steam-engine with a water-brake attachment. The hoist is Crane Brothers' latest patent; the cast-iron columns used in this elevator, which is 101 feet high, were made in Birmingham by C. P. Williamson. The three stoves, 19 feet in diameter and 76 feet high, are the new Whitwell hot blast in all its completeness, with gas and air-valves and facilities for cleaning. The lining of the stoves is built of Ohio brick. The furnace has a battery of 20 boilers for both furnaces, each 46 inches in diameter and 34 feet long, with two 16-inch flues. The stack is 75 by 18 feet. The two blowing-engines weigh 80 tons each, the weight of the wheels being 16 tons, 16 feet diameter. They were built by the Cuyahoga Forge and Furnace Company, of Cleveland, Ohio. Just in the rear of the furnace plant are 251 coke-ovens, all making coke, with the exception of a few which will be fired this week. Ample storage is provided for stock. The coal storage-room is one of the largest in this region, and has a capacity of 5500 tons. A large number of chutes make a convenience for emptying the coal into larries, which are run upon an hydraulic hoist—the simplest, cheapest, and most durable mode of elevating heavy material in large quantities. It is the expectation of the Alice Company to make 90 tons of iron daily with the new furnace. The average of the old is about 50 tons.

The Cummer Engine Company, Cleveland, has just put in place a 500 horse-power engine for the Brush Electric Light Company, to be used in the manufacture of storage batteries. The company is also sending a 250 horse-power engine to Minneapolis, and has about completed ten large Class B engines, which go to New England. Five of these will be shipped this week. The Cummer Company finds its facilities are not equal to the demands of its trade, and the contemplated addition, 100 by 60 feet, will be erected as soon as possible. This space will be devoted to erecting work, will be swept by three traveling cranes, and will enable the company to carry forward and complete forty engines together. The system of special tools is such that its engines are put together without any lining or facing up, or any special fitting whatever, and its facilities for shipping are so complete that a one-horse outfit is not kept busy half the time, every thing being received and shipped directly to and from the works. In passing through the works, it was noticed that there was a system of electric call-bells and errand-boys, by which a workman could secure any tool he needed without loss of time. It was also noticed that the castings fresh from the molds were unusually smooth and perfect, and the most complete system prevailed in all departments. The Cummer Company has evidently come to stay and to be an aggressive competitor among the manufacturers of high-grade engines.

The Brown Hoisting and Conveying Machine Company, of Cleveland, is fitting a coal storage-house on the Milwaukee dock with three of its hoists. The building is 400 feet by 164, 50 feet high, and will have a capacity to store 35,000 tons of anthracite. The three tramways are suspended from the roof-frame, and adjustable so as to enable the operator of the hoisting apparatus to deposit the coal in any part of the building he desires. The plant will be capable of handling from a vessel and depositing in the building from 1000 to 1200 tons per day, the machines each being operated entirely by one man. The company has shipped and now has in operation an extensive plant for handling coal from canal-boats to storage house at Varrangeville, France. There are also three of its machines in operation on the New York, Pennsylvania & Ohio ore-dock in Cleveland, and another plant is erecting on the dock near the water-works.

The Cleveland (O.) Forge and Iron Company has just placed in its shops a sixty-foot lathe with sixty-inch swing, made by Thomas Shanks & Co., Johnstone, near Glasgow, Scotland.

E. P. Allis & Co., of Milwaukee, Wis., have recently built a pair of blowing-engines for the Edgar Thomson Steel Works, Pittsburg. The air-cylinders of these engines are 56 by 56 inches, and the steam-cylinders 36 by 56 inches. The aggregate horse-power is 1100.

The government is constructing at the naval arsenal in Washington two six-inch steel rifled guns, and will shortly begin on two ten-inch breech-loading steel rifles. These last will be twenty-seven feet long and forty-two inches wide, weighing each 24 tons. The tubes and jackets are to be imported from England. All of the above-mentioned guns are for use on the new steel cruisers. The ten-inch guns will be very powerful, being able to throw projectiles weighing 500 pounds. The government has never before made any steel guns, but it has a six-inch steel rifled gun, made at the South Boston Steel-Works.

Keel Ridge furnace, at Sharon, Pa., has been blown in.

The new puddling department of Lindsay, McCutcheon & Co.'s mill, at Allegheny, has been shut down.

The puddlers of the Keystone Iron-Works, at Soho, have been put on double turn, to fill an order of 1000 tons of muck-iron for the American Iron-Works.

The Frances Manufacturing Company, of New Britain, Conn., will build another foundry 130 by 40 feet.

The Vesuvius Iron-Works, which have been closed since June 1st, will start in the puddling department to-day and in the nail factory on the 15th.

The Pennsylvania Lead Company, at Mansfield, O., refiner of base bullion, is now using natural gas.

The rolling-mill of the Lake Superior Copper Works Company is running full-time, and finds a ready market for its product, which consists of sheet-copper, copper bottoms, etc. The company has a furnace in connection with its mill, in which it smelts most of the mineral from the Wolverine mine, using the product of other mines only to fill special orders. Two of the furnaces at the smelting-works, Hancock, are rebuilding.

The New London, Conn., Scythe Company has just closed its business for the year past, during which time it manufactured 11,500 dozen scythes, 4000 dozen axes, and 500 dozen hay-knives. The company has been in business since 1835, and did the largest amount of business last year it ever did in one year. On the 21st ult., the company organized as a corporation under the laws of New Hampshire.

Hewes & Phillips's Iron-Works, Newark, N. J., have several very heavy specimens of the machines they build under construction. An immense slotting-machine, weighing over 40 tons, is about completed for the Miller Forge and Iron Company, Pittsburg, Pa. There is a planer of 45 tons weight well under way for the Oregon Iron and Steel Company, Oregon. Several of their standard Allen engines are in various degrees toward completion, one for the Eden Paper Mills being almost ready for shipment. A great deal of care and labor are devoted in these works to giving bearing surfaces accuracy. Ground journals and hardened pins are a regular feature. But all other than bearing surfaces are painted, no polished finish being made for ornament alone.

The Pennsylvania Bolt and Nut Company is fairly started in its new works at Lebanon, Pa. The wareroom is 150 by 50, three stories in hight, with a car-track for the first and second stories. The machine-shop and finishing-room is 120 by 80, the burring-room 60 by 20, and the factory, which contains a 10-inch train of rolls, is 80 by 120. The most improved machinery has been introduced.

The Babcock & Wilcox Company, of New York City, has just issued a circular announcing that Mr. William F. Zimmerman has been appointed manager of its Pittsburg office for the sale of its water-tube boilers. Mr. William Kent, who has had charge of the Pittsburg office during the past year, has been transferred to the general office in New York, as superintendent of the sales department.

The Western Nail Association met August 8th, and decided to order a general resumption of mills for a period of four weeks from next Monday. Trade is light, but the outlook for the fall is encouraging.

Robert Wetherell & Co., of Chester, are now building one of their Corliss engines for the Philadelphia water-works, which will have a horse-power of 1000 and a pumping capacity of four million gallons. This firm is also building an engine for the cotton mills of Matthews & Co., of Selma, Ala. The cylinders of this engine are to be 24 by 48 inches. An engine which it is building for Pope, Cole & Co., of Baltimore, is to have cylinders of 24 by 60 inches dimensions. Messrs. Wetherell & Co. employ 350 men, and turn out an average of six engines per month.

The Cuyahoga Steam-Furnace Company, of Cleveland, has recently built a pair of its blowing-engines for the Franklin, N. Y., Iron-Works, and also a pair for a furnace at Hanging Rock, Ohio.

Malleable iron-works are to be started in Keokuk, Iowa, at an early day. Ground has been purchased and preparations are going forward toward the erection of a foundry, 25 by 30 feet, and finishing-shop, 25 by 40 feet.

The Newburg, Ohio, blast-furnace, which has been idle for several months, has been bought by the Union Rolling-Mill Company. It will be started up some time next week.

The Excelsior Iron-Works, of Chicago, are building a complete copper plant of 30 tons capacity, including engines, boiler, blower, crusher, etc., for the Rocky Mountain Mine-Developing Company. The plant is to be erected at Cañon City, Colorado.

There are three incorporated companies in Warren County, Pa., for the purpose of supplying natural gas for light and heat. Each company has a capital stock of $100,000. These are about to be consolidated into the Warren Light and Heat Company, having a capital stock of $300,000, with Frederick P. Hays, formerly of Pittsburg, as president.

GENERAL MINING NEWS.

ARIZONA.

GILA COUNTY.

OLD DOMINION.—The vapor fuel furnace is now finished. As soon as the petroleum arrives, smelting by that process will begin.

CALIFORNIA.

FRESNO COUNTY.

The prospects of the quartz mining industry are cheering, and quite a fever for prospecting has recently sprung up. Shrewd mining operators are coming in daily, and properties are changing hand.

MONO COUNTY—BODIE DISTRICT.

SPAULDING.—According to the *Free Press*, the personal property of this company, at Bodie, consisting of steam-pumps, pans, shoes, pipe, etc., has been sold by the sheriff to satisfy a Superior Court judgment in favor of A. F. Bryant for about $1800 and costs. Mr. Bryant bought the property for $592.50.

PLUMAS COUNTY.

TAYLOR-PLUMAS.—During many weeks past, the only work done at the mine has been putting down a shaft to reach the ledge near the mill. This end has now been accomplished; the ledge is reached. A good deal of water has been encountered; but still the work is pushed on with vigor.

SAN BERNARDINO COUNTY—CALICO DISTRICT.

GARFIELD.—Work progresses with good results. The lower tunnel is in about seventy feet. The main shaft will be sunk seventy feet farther, to connect with the tunnel. The south winze connects with the lower tunnel. The bullion returns from this mine are very satisfactory.

GOBBLER.—The ore taken out is hauled daily to the Alhambra mill. The mine is improving in appearance, and is working in an extension of a rich body of ore.

GOLCONDA.—The claim is carefully prospected and ore has been found in at least a half-dozen places. In about the center of the claim, a shaft has been sunk fifteen feet, from which some good ore has been taken. About seventy-five tons of low-grade ore that will average $60 to the ton are on the dump.

PLUTARCH.—The lessees are working the east end of the claim. Work has been suspended in the shaft, which is down forty feet. The ore in this claim lies in deposits and also in seams.

CANADA.

BELLIVEAU ALBERTITE MINES.—In view of the beginning of boring operations at these mines, the St. John *Telegraph* gives a short sketch of the history of the project. The company owning the mines was organized in 1875 with a capital of $500,000. It owns about four and a half square miles of land in Westmoreland County, extending from the Petitcodiac to the Dorchester River. A shaft 52 feet deep was sunk in 1877 and extended to 267 feet in 1879, and two tunnels afterward were run, one being 326 feet and the other 330 feet long. Small deposits of albertite were found and much inflammable gas. In May, 1879, a discovery of albertite, near the surface, in one of the veins at Taylor Village, induced the manager to prosecute its further development. Shales were struck at a depth of 40 feet from the surface—the vein passing into them. With the view of testing this and the other veins in this locality, a diamond borer was purchased from the government and put into operation in the month of November. At the depth of 100 feet, the borer, at an easterly angle, passed through seventeen inches of albertite, and was continued down through the shale a depth of 335 feet without again striking the vein. A second bore-hole was started a few feet southwesterly from the first. At a perpendicular depth of 170 feet, the drill passed through 49 inches of albertite, the vein being apparently a continuation of that struck at a depth of 160 feet in the first bore-hole—the horizontal distance between the two points being about 15 feet. The second hole again passed through 14 inches of albertite at a depth of 210 feet from the surface, or 30 feet below the 49 inches of albertite; and again, at a depth of 302 feet, passed through two inches, and was continued to a total depth of 325 feet. In view of these interesting developments, and from the fact that the vein extends horizontally along or near the surface a distance of 400 or 500 yards, the manager was instructed to sink a pit near the vein a depth of 200 feet. A shaft was then begun about 20 feet westerly from the 170-foot hole, and sunk to the depth of 165 feet, when a tunnel was projected easterly, to strike, as it was supposed, the

vein of 49 inches. This they did not do ; but about the distance from the mouth of the tunnel, and where it was supposed this vein would be, gas made its appearance in such quantities as to make artificial ventilation necessary to render the tunnel fit to work in. This issue of gas was so great that the work was delayed for several weeks, and on three several occasions took fire, and the tunnel had to be flooded to extinguish it. It is now asserted that a mistake was made in the measurement of this shaft, and that it was not as deep down by about 20 feet as the 49-inch vein which they were in search of. The escape of gas from the mouth of the bore-hole, when lighted, burned so brilliantly that it was plainly visible at night for a long distance in the surrounding country, and was found to be so great that, by inserting a pipe securely at the surface, it was brought into the engine-house, not far from the shaft, and utilized, burning night and day, and giving them ample light at all times for five or six months, until their work ceased at that place, and has been ever since escaping through this shaft, now filled with water, as also through the bore-hole, until filled up by some mischievous person, as it now is. Mr. George Botsford, of Fredericton, holds the exclusive right of prospecting over the lands of this company, and it is by him that the diamond borer has been brought to the mines.

ONTARIO.

A number of American mining companies are working mines in Ottawa County. The American Phosphate Mining and Land Company has carried on active operations in the township of Templeton since September, 1882. Preparations are making to begin work on the property of the International Mining and Land Company. The company owns 1700 acres of phosphate lands. The Dominion Phosphate and Union Phosphate Mining and Land companies are carrying on successful operations on their respective properties.

COLORADO.

ARAPAHOE COUNTY.

The consolidation of the Grant Smelting Company and the Omaha Smelting and Refining Company was consummated a month ago ; but was not made known to the public until recently. The capital stock is fixed at $2,500,000, and the company is incorporated for one hundred years, dating from the 5th of last month. There will be no changes in the location of the works or the administration of affairs, as the new order of things has been in existence for a month, and the action there announced is taken merely to perfect the record. The ore smelted by the Grant smelter has been refined at the Omaha Company's works for the past three years, and the two have been co-operating that length of time. They are now placed under one management. Sidney Dillon, President of the Union Pacific Railroad, is one of the parties brought into direct interest in Denver's welfare by this transaction, he being one of the stockholders of the Omaha Company. The following gentlemen have been elected directors by the stockholders of the new company : Guy C. Barton, Edward W. Nash, James B. Grant, Edward Eddy, William H. James, Charles Babcock, and J. H. Millard.

CHAFFEE COUNTY.

FREE GOLD.—Negotiations have been pending for the leasing of this company's property, which, if completed, would have put in operation the 25-stamp mill belonging to the company.

WEBER.—This mine, which has lain idle since last season, is to be started up vigorously. Machinery will be erected and shipments of ore will soon begin.

CLEAR CREEK COUNTY.

BARD CREEK.—This company has been organized to develop the Blue Grass lode on Democrat Mountain. The level now running on the vein from the Bard Creek side of Democrat is in over eighty feet, and shows two feet of quartz which assays forty ounces silver.

NEW YORK & COLORADO.—Work at grading for the new fifty-ton stamp-mill of this company, above Empire, is going forward. Twelve men are running three shifts daily on the Big and Little Chief drifts. The former is in 110 feet, the latter 50 feet. The Big Chief crevice at the creek is 100 feet wide, and prospects well in gold. In the breast is good quartz. Twenty thousand dollars have already been paid down toward the mill, and monthly dues thus far have been promptly met.

PAY ROCK.—The concentrator has now been running about six weeks, double shift, treating forty tons per day, or 1000 tons a month. Its success mechanically and financially has been demonstrated beyond a doubt. The exact financial results attained are not at this date available ; but as part of the ore shipped has gone to the Georgetown mills, and as the July product is at least $5000 above that of June, some notion can be formed of what is accomplishing.

SNOW DRIFT.—In this property, six parties of lessees are at work, and all in good ore, so that leases with thirty-five per cent royalty command a handsome bonus.

HINSDALE COUNTY.

LITTLE PRINCE.—This mine has been sold to Mr. J. L. Shiek, of Denver, for $20,000.

VERMONT.—A large body of gray copper with native and wire silver has been opened up in the 2d level. At present, they are stoping and taking out a very fine lot of ore. The tunnel is now in over 90 feet at a depth of 200 feet.

LAKE COUNTY.

The ore-production of the Leadville mines, during July, was only a trifle in excess of the previous month, amounting to probably 35,500 tons, against 31,800 during June.

Among the mines showing a decrease are the following : Silver Cord, 500 tons ; Mike & Starr, 200 tons ; Nellie S., 600 tons ; Catalpa, 200 tons ; and several others in smaller amounts, making a total of about 1500 tons.

Among the properties showing increased productions are the following, with their respective increases appended : Henriett, 700 tons; Clontarf, 500 tons ; Little Johnny, 100 tons ; St. Louis, 100 tons ; Colonel Sellers, 300 tons ; Adlaide, 500 tons ; Crown Point, 200 tons ; total, 2400.

EXCELSIOR GOLD AND SILVER MINING COMPANY.—A concentrator is to be erected upon the Susie May lode for the treatment of the heavy body of low-grade ore. The vein discovered recently is opening up well, and the prospects for the future are very encouraging. The property is regarded as one of the best in Mosquito Gulch, and the owners are pushing work. On the completion of the concentrator, the force of miners will be increased.

GONABROD.—An important strike has been made in the sub-lease on this property. The first discovery of ore that was made was in a pocket which was exhausted after 70 tons had been taken out of it. New prospecting was then commenced, and from the shaft, which had been sunk to a depth of 100 feet, a drift was run 95 feet. A 6-foot body of galena ore was opened, and the assays made returned an average of 137 ounces of silver and 50 per cent lead. In the No. 1 shaft, another body of galena ore was exposed that averages about $48 per ton. Shipments will be resumed, and will continue steadily from this time.

IRON SILVER.—The Stone mine, during the past month, shipped about six thousand tons of ore. The product of the Iron Silver group, including the Iron, Stone, and leased mines, for July, exceeds ten thousand tons, or the largest monthly product ever made.

The Lime, Seventy-Six, Rock & Dome, are all working under leases, while many of the dumps are sorted over, and concentrated by hand-jigs.

At the Stone mine, the company is hoisting through No. 2, No. 7, and No. 6, or cage shaft. At the latter, a test was made the other day to ascertain its capacity, and a record of twenty-eight cars an hour for the day secured. This, too, in addition to lowering timbers and performing other work with the engines. The cars hoisted contained on an average about three fourths of a ton of ore each.

The Moyer shaft, situated several hundred feet east of the Stone mine, and started about five months ago, has attained a depth of about 250 feet. The shaft is calculated to encounter the contact in its eastern dip at a depth of three hundred feet.

SILVER CORD.—The work of adjusting the losses sustained by the company at the recent fire has been completed, and preparations are making for replacing and repairing the plant. Examination showed that the large hoisting-engines and rigs were not irreparably damaged, and a force of mechanics will be set to work immediately, making good all injuries. A good deal of the other machinery contained in the building at the time of the fire can also be repaired, and it is expected that a comparatively short time only will elapse before the mine will be properly equipped and in full running order again.

TWIN LAKES HYDRAULIC GOLD MINING SYNDICATE (LIMITED).—This company, which is an English corporation, has purchased for $300,000 the placer ground situated between Granite and Twin lakes. The property embraces the well-known claims in Cash Creek, Young America, and other gulches. The Cash Creek property, formerly owned by the Gaff Mining Company, is the best developed of the group. Just before making the transfer of this property to the newly-organized company, a clean-up was made, yielding eight thousand dollars. The auriferous pay gravel on these claims has a thickness of from twelve to three hundred feet, and has yielded largely in the past. They were first discovered in 1859, and many of them have been worked steadily ever since. All told, there are about nine miles of ditches and flumes, which, together with natural water channels, afford an available water supply equal to twenty thousand miner's inches. The company will take hold of the property immediately, and push its development with all possible haste. Among other work to be commenced at once is the construction of a large water-ditch, five miles in length. The construction of a telephone line from Leadville to the placer-fields, a distance of about twenty miles, is in progress, and also the erection of office and other buildings.

OURAY COUNTY.

AMES.—The smelter is no longer an experiment, but an assured success. In a run of less than four weeks, with ore-furnace, ten car-loads of bullion were produced.

MADISON.—Eight feet of brittle and ruby silver and gray and yellow copper have been uncovered on this claim. Two hundred and fifty sacks have been taken out.

ROSE.—A recent discovery of rich gold and crystal-bearing quartz is reported. The strike is in the main tunnel of the group.

PUEBLO COUNTY.

PUEBLO SMELTING AND REFINING COMPANY.—Two thirds of the employés are out on a strike for increased wages. The prices demanded are as follows : Furnace-men and feeders, $3 per day each; weighers, wheelers, pot-pullers, and calcimer men, $2.50 per day each ; roustabouts, $2 per day each. The prices heretofore paid by the company, and which have been in force for the past three years, are : Furnace men and feeders, $2.50 per day each ; weighers, wheelers, pot-pullers, and calcimer men, $2 per day each ; and roustabouts, $1.75 per day each.

DAKOTA.

CALEDONIA.—For the week ended July 29th, the superintendent reports : Ore produced, 1050 tons. The header on the 400 level is in sixteen feet. The last four feet improved very much in appearance and also in quality of ore. All other parts of the mine are looking the same as usual.

ETTA.—San Francisco parties have purchased this mine for about $50,000. The work of development continues for the present ; and as soon as the company has secured control of the property, the mining and reduction of the ore on a large scale will be commenced.

FATHER DE SMET.—The superintendent reports, July 19th : Herewith express company's receipt for bar No. 163, containing 908·9 ounces of gold, the result of run of mill for first half of July. On the 16th inst., I drew for $20,300, which amount was for all expenses incurred during the month of June. The engine in mill is doing better work than at any time for the last five years, and a new one will not be required, as we supposed a year ago. Nearly all the ore-faces are showing a decided improvement in both quantity and quality. We are at present ordering supplies for the coming year from Chicago, among the lot being 600 stamp-shoes, iron, candles, oils, etc. For the week ended August 1st, the report shows : Ore extracted from first, second, and third levels, 3000 tons. Ore milled, 3000 tons. Tramway level rise for month, 25 feet ; total, 105 feet finished. Golden Gate east cross-cut advanced 7 feet ; for month, 19 feet.

KING SOLOMON.—The Black Hills *Journal* states that the affairs of this company do not seem to be in the best possible condition. The men who have worked on the mine have not been paid, though wages for several months are long past due. Recently a large number of claims were filed against the company.

GEORGIA.

CHICAGO & GEORGIA.—This property, after lying comparatively idle for some time, has passed into the hands of energetic parties, who have added to it, by purchase of adjoining lots, a large amount of valuable mining ground. They have also erected an entire new plant. A new cut has been commenced, which will give access to the veins at a point considerably below the bottom of the old one. The twenty-stamp mill has been started up on ore from the new cut.

IDAHO.

BULLION CONSOLIDATED.—The company is loading on teams for its mines in Little Smoky Mining District a very complete outfit of machinery and supplies, consisting of a steam saw-mill of improved make, with ample power for extra saws, planer, etc. A concentrating-mill of 50 tons capacity, the machinery for which has already arrived and is now loading on teams to be taken from the railroad depot to the company's mine, will be erected at once.

WOOD RIVER REGION.

The Mayflower, Bullion, Jay Gould, and Idahoan have each had concentrating-works placed upon the properties to concentrate the second-class ores which would not pay for shipping. All of these use jiggers with good results, producing concentrates as rich as if not richer than first-class ores. Each of the mines named looks well, as does also the Eureka mine.

At Ketchum, the Philadelphia Company has a fine smelting-plant, two stacks in operation, and two new ones ready to start.

The new twenty-stamp silver mill at the Vienna mine has been in operation some three or four weeks, and is doing fine work. This mill is owned by a company owing and operating the Vienna, Mountain King, and some other mines. The former is turning out very rich ore, but the body is not so large as that of the Mountain King, which is classed as a mammoth mine. The company is working about the mill and mines 125 men. The Solace mine is lying idle from want of water, but expects to start up in a few days, and will be pushed with a good force of men.

Sawtooth is reported dull, with but little life in the camp because some of the properties are tied up, or in the hands of companies not disposed to operate at present.

YANKEE FORK REGION.

A correspondent of the Salt Lake *Tribune* says that Bonanza is the center the Yankee Fork mining country, where once there was much activity in place mining, and, later, in prospecting for quartz leads and opening them up. With the discoveries and consequent excitement in the Wood River country, this locality became much neglected for a time, and Bonanza and the country around has had but little life the past three years.

The Charles Dickens is the best mine in the district. There are 2300 feet of tunneling. The main tunnel is in 950 feet, and a shaft 120 feet connecting the upper with the lower tunnel. The ore is free-milling gold and silver, the vein averaging from 1½ to 6 feet, and runs from the top of the ledge down; 500 tons of first-class ore will be milled the coming month at the Custer mill. Over 300 tons are sacked and ready for shipment, which will average $200 a ton. About $4800 in gold bullion has been shipped this season, the work of the arrastra from low-grade ore. The arrastra works two tons daily. There are 8000 tons of second-class ore on the dump, averaging $50 a ton. Last season, thirty tons of first-class ore were shipped to Salt Lake, averaging $860 per ton. The mine never looked better, some of the ore assaying $4000, some going as high as $25,000 per ton. The only thing needed is a good stamp-mill to work the ores.

The Juliette is the eastern extension of the Charles Dickens, has just started work. The shaft is down twenty feet and the vein five feet wide, the ore averaging from 100 to 400 ounces silver and a percentage of gold.

DAN O'CONNELL.—This mine is situated on Dickens Hill, parallel with the Charles Dickens claim. Several tunnels are run on the vein. The vein is three to five feet. Considerable ore is on the dump.

PILOT.—This is at the west end of Dickens Hill. The vein is from four to five feet; the tunnel is in 46 feet, with the same class of ore as the Dickens.

PARADISE GROUP.—This comprises the following mines: Paradise, Washington, Fair Play, and Passover, owned by John G. Morrison. This group is situated west of the Pilot and is an extension of the Dickens ledge. There is a tunnel in 75 feet on the Washington. The main tunnel in the Paradise is 200 feet, having some very rich ore.

Mr. Morrison is working his placer claim on Jordan Creek, and is getting out some coarse nuggets. He is ground-sluicing and hydraulicking, uncovering the ledge of the Paradise group, where he will be apt to find some rich ore adjacent to the ground where the largest nuggets were found. The placer claim is very rich and paying well.

MONTANA.—This is situated in Yankee Fork Mining District, and is at the head of Jordan Creek, six miles from Bonanza City. It has a shaft down 350 feet; tunnel run in on level 185 feet. The vein in the shaft is eight feet wide. The ore, averaging $150, is free-milling gold and silver, gold predominating. The mine is shipping 350 tons of ore to the General Custer mill, which will be worked by the first of August. Forty tons worked this spring at the mill averaged over $600.

WHALES.—This is situated one mile west of the Montana. The ore croppings are traced for over 800 feet. The vein is from 8 to 15 inches, going from $300 to $2000 per ton. It is looking well and will prove to be a good property.

Two miles north from Bonanza City is a thirty-stamp mill, run by 118 horse-power Harris-Corliss engine; three 54-inch boilers, 16 feet long, 8 pans, and 4 settlers. The General Custer mine and the Unknown are owned by the General Custer Company. The mill was built in 1880, and has been working on General Custer ore continually up to the present, but is now clearing up, and will start working ore from the Unknown. The bullion has averaged over $60,000 monthly; 35 tons of ore were worked every twenty-four hours. The mill employs 32 and the mines 36 men. The mill this season has worked custom ores from the Montana, Charles Dickens, and Badger, and will work ten stamps on Montana and Charles Dickens ore the coming month.

KANSAS.

According to reports, persons engaged in digging a well recently on Governor Dale's farm, five miles northwest of Yates Center, at the depth of twenty feet struck a large vein of silver ore, specimens of which were assayed and found to be very rich. Several shafts are sinking.

MEXICO.

Correspondents of the Mexican *Financier* show that matters are not of a lively nature at Pachuca. The board of directors of the Encino mine, it seems, are having a new survey made of the workings. No doubt before long, this mine will be in full blast once more. The New Progreso hacienda is to start up in a few weeks. It seems so strange, in this enlightened age of improved machinery of all kinds, that a large and powerful company, like the owners of this hacienda, should, instead of putting in all the latest improvements, go back to the ways of the time of the Conde de Regla.

Nothing is doing with the Magdalena mine, owing to some misunderstanding among the stockholders; but work at the next mine to it, the San Nicolás, is pushed. The mine is now down 140 varas. At 10 varas deeper, a cross-cut of from 15 to 20 varas is to be made on to the principal lode. The Corpus Christi mine, which is quite close to the above, goes into the hands of a New York company of which Capt. George Brown, of the New York Board of Marine Underwriters, is president. The San Diego mine is down some 64 varas. There are some very good indications of paying ore.

The Pachuca River Concentrating Company's works are going up as fast as can be expected. The heavy rains that have prevailed here during the past month have been very much against them; but still the early part of August will see them hard at work. Owing to the unusual amount of water in the river of late, they have been unable to extract any quantity of tailings.

The new lode at the Guadalupe mine is turning out much better than was at first thought. Stock of the Anglo-Saxon Copper-Works Company is going up. There was a sale here last week of 20 *bonos* at the rate of between $50 and $60 each. This stock was bought, we believe, for parties in England.

The Real del Monte Company's new hacienda of San Antonio is pushing ahead night and day. The news from Chihuahua indicates a flourishing state of things. The mill, buildings, etc., of the Santa Eulalia Mining Company are nearly completed, and the first shipment of bullion is expected by the end of next month.

A big find of copper is reported east of Santa Rosalia; also a very rich deposit of quicksilver near Huajuquilla. Americans are prospecting both.

Judge Shaw is fitting out in Chihuahua to begin work this rainy season on his Santo Domingo placer. This placer is supposed to be the largest and richest on the continent, containing over 2000 acres

Final settlements in the sale of the Refugio mine are making in the United States. The ore now runs high, and from 100 to 500 ounces to the ton are worked out.

The Jesus María District is looming up, work being pushed as rapidly as possible. The Tabor-Weston men expect to ship bullion shortly. Mr. Stanton, of the Santa Edowigis Mining Company, has on the way a smelter, concentrator, 25-stamp crusher, saw-mill, etc, and hopes to be running by the end of August. The ore runs from 40 to 1000 ounces. The Knotts Silver Mining Company, of Parral, has abandoned the idea of pumping out the old Prieta mine and is sinking a new shaft. The mill is turning out silver regularly every week.

The Aguilarania mine is down 278 feet, and the men have already cross-cut some 40 feet, and expect to have to go 40 feet more before striking the vein. They are sinking as fast as possible.

The Dry Mountain Company's work is still shut down, awaiting the settlement of the company's financial troubles. Formal work has been stopped on the Veta Grande, awaiting hoisting machinery. The Philadelphia Syndicate has started work on its Gigas mine. The ore is low-grade, but in large bodies.

Mr. V. A. Cowdery, of New York, has begun sinking a new shaft on the Southern extension of the Jesus María mine. The Jesus María seems to improve every day. A rich body of ore 12 feet wide has been opened up lately.

The Stirling Company has its pans in place, and expects to begin running immediately. It is turning out large bodies of ore from its Pedrasania mine. The Ward Mining and Milling Company, of Parral, has begun work on the foundations of its Stetefeldt furnace. The engine and pans are already in place, and there was a trial run on some old tailings, which worked well. The old mill still continues to turn out bullion.

The Tecolotio mine has been sold, and the new company is clearing the ground and getting in the foundation of its mill to smelt 100 tons of ore a day. The mine can produce twice that amount of ore. Every thing is in readiness to put in the new pumping and hoisting machinery at the San Francisco del Oro.

The Providencia Mining Company, of Philadelphia, has nearly completed the smelting hacienda on the river Listin; but before the end of the rainy season they do not expect to do any more than make a trial run.

Charles H. Ward, in the Carmen District, has nearly all his machinery for a forty-stamp mill on the ground, but, until after the rains, will continue to use the old patio process. The mine is looking well, showing very good ore, but inclined to be streaky.

Gen. H. P. Bee has resigned from the Washington Jude Mining Company and Mr. Frank B. Hein, of Silver Cliff, Colorado, is now in charge. The mill is not running, and the company is only working its San Antonio mine, which looks very fair, having an 18-inch streak of good galena ore, averaging about 90 ounces to the ton. The Jude Mining Company, of Washington, has also begun to open up its mines in a small way. Good reports come from Guanacevi, though as yet but little work has been done, and from Mapimi, where the smelters are a success.

The Sierra Mojada District is not doing as well as it should, on account of the cost of the reduction, no stone in the country standing more than one week in the furnaces. The district is, however, shipping three car-loads a week of base bullion to England.

MICHIGAN.

NONESUCH.—This copper mine has been closed to await further developments in the way of additional funds, the company refusing to advance further amounts. About $400,000 have been expended on this property the past year in machinery, buildings, etc, and it has one of the finest plants in the country. Twelve thousand cords of wood, 1800 barrels of salt, and several hundred barrels of copperas are in stock.

MONTANA.

SUMMIT VALLEY DISTRICT.

ANACONDA.—Eexcavating for the new smelter building began July 23d.

CLARK'S FRACTION.—Recent developments show favorable prospects. The sill-floor of the 80-foot level is now 40 feet wide, showing a breast of ore the entire width which assays 50 and 60 ounces. On this level, the workmen are putting in square sets forty feet wide. The Fraction is on the Rainbow lode, between the Alice and the Magna Charta. The peculiarity of the lode is that, wherever it has been developed, it has been found to be from 50 to 60 feet wide, having a well-defined north, south, and center vein of pay, separated from each other by porphyry and barren vein-matter. The Fraction is situated upon lower ground than the Alice, Moulton, or Magna Charta, and just west of a gulch which seems to have changed, at that point, the formation of the great lode, so that it bears ore of a high grade clear across the lode, in place of the porphyry and barren vein-matter which characterize the lode elsewhere.

MAGNA CHARTA.—At this mine, the principal work just now is the sinking of the 3-compartment shaft to the 600. Sinking will be vigorously prosecuted, and the north, south, and center veins of the Rainbow lode, which carry the same characteristics in this mine as in the Alice and Moulton, will be thoroughly developed by cross-cuts, drifts, and levels. The stopes of the upper levels are looking well and producing their usual output of ore.

MOULTON.—The winze from the 300 southwest drift is looking well; but extraction from this valuable ore-body has been temporarily suspended pending the running of a connection with the surface, which has become necessary for purposes of ventilation. Ore is stoped from the 200 west drift, where the ledge of high-grade is looming up bigger than ever, having widened to 6 and 7 feet of solid pay-ore of high grade, clear across the face.

POLLACK.—The Clark Brothers, of Walkerville, have leased this mine, situated northeast of the Alice. They will put a force of men at work, and thoroughly develop the property.

NEVADA.

The custom of working mines on tribute, says the *Sentinel*, is growing more and more general in the Eureka District. Chances that were formerly taken by mining companies are now largely taken by individual miners who try their fortunes in "pitches." At present, the tributers in the Alexandria, Hamburg, Phœnix, and other mines that we could mention are making more than $4 a day. In the first-named mine, the tributers for July made only a little less than $200 each.

It will be learned with pleasure, particularly to Gold Hill, says a local paper, that, by turning the water from the ranches up toward the head of the Carson River, sufficient water will be obtained to run the mills to their full capacity. Thus all the miners may resume work and all go on as usual in the Yellow Jacket, Kentuck, Crown Point, Belcher, and all the other mines.

ALTA.—At the mine, they are getting things in shape for pumping out the lower levels. This will require three or four months. The water now stands at the 1100 level, and between that and the 2150—the lowest level—there are at points some very long drifts; besides, the ground is about as thoroughly saturated with water as when the mine was first opened. The short distance that it is required to pump the water will, however, greatly expedite the work. Also, the strain on the apparatus will be greatly reduced, as all the pumps from the 1030 level to the surface will be taken out. This will make the lower pumps run light.

MARTIN WHITE.—An official letter says that there is but little change to note in the condition of the mine or the quality of the ore. The cave drift is looking well; the drift to the south is in about 15 feet, and the ore is about as wide as the drift and extending above and below. Much of this ore is of good quality, 50 or 60 ounces. A drift to the north has been started, showing good ore on that side also. The stope opened on the M. P. level is looking fairly, but it will take several days yet to prove it. The rock is rather hard at present for good ore, still it looks well and generally assays well. Stope No. 2 is in good ore; No. 1 is not at present.

MEXICAN.—The work of repairing the Central tunnel and the old Mexican shaft will now soon be completed, when a great amount of low-grade ore may be cheaply extracted from the old upper works.

SILVER STATE CONSOLIDATED.—The contractors in this mine are making good progress. The company is drifting toward the croppings from the end of the tunnel. Some low-grade ore has been struck, and the indications are better now than they have been heretofore. In working toward the croppings, many changes in the ground are taking place.

NEW HAMPSHIRE.

CRANE.—Work has been resumed at this mine.

MASCOT.—The company has received from the Cunningham Iron-Works a seventy horse-power engine and boiler for its new concentrating-works.

NEW MEXICO.

OLD MAN.—At a meeting of the stockholders held recently, the following officers were elected: President, J. W. Fleming; Vice-President, C. P. Crawford; Treasurer, R. B. Higbee; Secretary, John A. Moses. The Board of Directors consists of J. W. Fleming, C. P. Crawford, R. B. Higbee, P. June, and C. Osborne.

NEW YORK.

A large deposit of mica has been found on the farm of Wilson Brown, at Chester, Warren County. About one thousand pounds have already been taken out, and tests prove the mica to equal in quality that of North Carolina.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Aug. 10.

There is nothing of special interest to note in the mining market. A large business has been done in the fancies, but the high-priced stocks remain very quiet. Prices have been a little better, as a rule, but have not gained materially. Horn-Silver has been the exception, for some reason selling quite weak to-day. The Comstocks have been fairly dealt in, but have been very irregular in price, owing to several assessments being levied. We give a summary of the market below. The total number of sales aggregates 193,655 shares, as against 190,513 last week.

The Comstock shares have been moderately dealt in at irregular prices. California was quiet and irregular, selling from 37@44@40c. Consolidated Virginia records a small business, and has been weak, selling from 67@59c., assessment paid, and from 33@43c., assessment unpaid. Sierra Nevada has just levied an assessment of one dollar per share. It has been weak in consequence, and has sold from $5.75@$4.90. Union Consolidated has been quiet and irregular, selling at $6.50@$6.25, assessment paid, and from $4.90@$5.75@$5, assessment unpaid. Ophir was quiet and steady, selling from $4.25@$4. Consolidated Imperial, with a small business, was steady at 8@7c. Best & Belcher sold at $4.50. Sutro Tunnel was quiet and steady, selling from 23@20c.

The Leadville stocks were also moderately dealt in and were steady. Amie was quiet and steady, selling from 15@18@17c. Chrysolite developed a little weakness, under a small business, and sold from $1.25@$1.10. Dunkin was quiet and steady at 24@20c. Iron Silver was strong, selling from $3.05@$3.15, the sales amounting to 650 shares. Leadville declined from 45@30c.; the dealings were small. Little Chief was a little weak at 43@39c., and Little Pittsburg was quiet and steady at 65c. Climax had a small business and was strong, selling from 6@10c.

The Bodie stocks were very quiet and were weak. Bodie, under a fresh assessment of fifty cents a share, was weak, selling from 50@35c. Standard showed a little weakness, with a small business, declining from $6.63@$6. Bulwer was quiet at 75c.

The Tuscarora stocks have been almost neglected. Argenta sold at 25c. Belle Isle was quiet and steady at 35@31c. Navajo sold at $3.10, with a business of 200 shares. North Belle Isle sold at 35c. Elko Consolidated records a small business at steady prices, selling from 16@15c.

In the miscellaneous list, Alice has been quiet and steady, selling from $2.30@$2.40. Bassick sold at $9.50. Eureka Consolidated was quiet and steady at $5.50. Gold Stripe sold at 7c., and Green Mountain was steady at 74c. Horn-Silver records a small business and has been weak, it sold from $7.75@$6.63. Robinson has been quiet and steady, selling from 66@76@74c. Sierra Grande was moderately dealt in at stronger prices; it sold from 88c.@$1. Stormont was quiet and steady at 35@34c.

Alta-Montana sold at 5c. with a small business. Barcelona has turned up as a very active stock this week. The dealings foot up 32,500 shares, selling from 46@44c. Caledonia was very quiet at $1. Central Arizona was quiet and steady at 15@17c. Decatur records a small business at steady prices, selling at 3@4c. Eastern Oregon has been actively dealt in, and has been strong; it sold from 85@87c. Harlem has been quiet and steady at $1.30@$1.35. Oriental & Miller had a small business at steady prices, selling from 13@15c. Rappahannock was quiet at 6c. Red Elephant records a fair business and was steady, selling from 7c@6c. Sonora Consolidated has been very active and hasgained a little strength; it sold from 24@30@29c. South Hite was quiet and steady at 4c.

MEETINGS.

South Silver King Mining Company, No. 154 Nassau street, New York City. A special meeting of stockholders, for the purpose of considering and taking action upon the subjects of bonding the mine, collecting installments in arrears, and such other necessary business connected therewith as shall secure the financial success of the company, together with the entire affairs of the company. August 17th, at one o'clock P.M.

DIVIDENDS.

The Castle Creek Mining Company, of Idaho, announces its regular monthly dividend of three per cent, payable on the 16th inst.

The Holyoke Mining Company, of Idaho, has declared a dividend (No. 11) of two per cent on the capital stock, payable August 18th.

The Jocuistita Mining Company, of Mexico, has declared a quarterly dividend of fifty thousand dollars—fifty cents per share—payable August 31st.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows on the petroleum market:

There was on Saturday last a strong market, the price being sharply advanced to $1.09 from $1.07. On Monday morning, while the fever was on, the opening was at $1.10, which was one cent above Saturday's closing; and during the day, the market was bid up to $1.13. This sharp advance appeared to be chiefly due to the organized action of the Standard or some bull clique to force the shorts to cover and induce public buying. The market broke back to-day and sold as low as $1.08⅛, closing, however, at $1.09⅛.

A very important well is expected on Saturday or Monday. It is Porcupine No. 9, situated in Balltown District, 400 feet north of the developed territory; and as it proves good or poor, the market is liable to be influenced. A new well near old territory on the Brady tract tapped the sand yesterday, and is showing for a good well, but is not yet fully opened. It is said that it opens some new territory. During the past week, Grandin No. 3, an old well that had almost ceased flowing, was torpedoed, and yielded 525 barrels during the first twenty-four hours.

The "runs" of oil to the Pipe Line Company from August 1st to 7th inclusive, are about 35,000 barrels ess than the deliveries; but the last seven days of July showed the reverse, consequently no reliance can be placed on statistics based on only a few days' figures. The demand for refined is light, but, simultaneously with the advance in crudeon Monday, it was marked up ½c. per gallon, and, in the absence of any demand, there seemed to be no good reason for it, unless it was designed to influence the price of crude. At this writing, refined oil is ⅛c. lower and crude oil is strong.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

		Opening.	Highest.	Lowest.	Closing.	Sales.
Aug.	4	$1.07¾	$1.09	$1.07¼	$1.09	2,326,000
	6	1.10¼	1.13	1.09⅞	1.11⅞	3,970,000
	7	1.12⅛	1.12¾	1.09⅝	1.10⅜	4,582,000
	8	1.10⅛	1.10¾	1.09⅜	1.10⅛	3,170,000
	9	1.10⅛	1.10⅞	1.09¼	1.09⅜	2.141,000
	10	1.08⅞	1.11	1.08½	1.09⅛	3,386,000
Total sales						19,575,000

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Aug. 3.	Aug. 4.	Aug. 6.	Aug. 7.	Aug. 8.	Aug. 9.
Albion	....	....	....	....	....	....
Alpha	....	2	1¼	1¾	1¾	2¼
Alta	.65	.95	.95	1	1	1
Argenta	....	....	.15	....	....	....
Bechtel	....	....	....	....	....	....
Belcher	.90	1	.90	1	1	1⅛
Belle Isle	....	....	....	....	....	....
Best & Belcher	3⅞	4¼	4¾	4⅝	4⅝	4⅝
Bodie	....	....	.40	.35	.35	....
Bullion	....	....	....	....	....	....
Bulwer	....	....	....	....	....	....
California	.25	.40	.45	.35	.45	.45
Challar	3⅛	3	3⅛	3⅛	3⅛	3¼
Con. Virginia	.30	.35	.40	.50	.50	.40
Crown Point	.85	1	1	1⅛	1⅛	1⅛
Elko Cons	....	....	....	....	....	....
Eureka Cons	6	6	5½	....	....	5½
Exchequer	....	....	....	....	....	....
Gould & Curry	2¾	3¼	3¾	3½	3½	3½
Grand Prize	....	....	....	....	....	....
Hale & Norcross	6⅜	6	6¼	6	6	6¼
Independence	....	....	....	....	....	....
Martin White	....	....	.25	.30	.30	....
Mexican	2⅞	3¼	3⅛	3¾	3¾	3⅝
Mono	....	....	....	....	....	....
Mount Diablo	....	....	5	5	5	....
Navajo	3¼	3½	....	....	3½	3¼
Northern Belle	7	6¾	6¾	....	....	6¾
North Belle Isle	....	....	....	....	....	....
Ophir	2⅝	3⅞	3⅞	4⅛	4⅛	4
Overman	....	....	....	....	....	....
Potosi	1⅛	1¼	1¼	1¼	1¼	1¼
Savage	2	2	2⅛	2⅛	2⅛	2⅛
Scorpion	....	....	7	8	8	7
Sierra Nevada	3⅞	4¼	4¼	5⅜	5⅜	5⅛
Silver King	....	....	....	....	....	....
Tip-Top	....	....	....	....	....	....
Union Cons	4¾	5	5¼	5⅞	5⅞	5½
Utah	2⅜	2½	2⅜	3⅛	3⅛	3
Wales Cons	....	....	....	....	....	....
Yellow Jacket	2⅞	3	3⅛	3½	3½	3⅜

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, Aug. 9.

Since our last report, the market has been fairly active, and in the early dealings a good degree of firmness was manifested in the leading copper stocks, due mainly to the fact that ingot copper was a fraction higher, and the demand more active. Sales of Calumet & Hecla were made at $250, against $246 the week before, but, owing to disturbances in the general market, as well as lack of buying orders, the price was not maintained, and later sales were made at $245, with the stock now offered at that price. Quincy holds its own well, and sales were made at $46¼@$46, an advance of $⅛@$¾ over last week. The July product of this mine was 300 tons, a gain of 75 tons over last year; and as the expenses were reduced some $10,000, the result, notwithstanding the lower price of copper, will compare favorably with last year's work. The mine has shipped about 1450 tons of refined copper since the opening of navigation. Osceola was heavy, and, under pressure to sell, the stock was forced down from $21@$19½. Franklin was also inclined to be weak, and on small sale declined from $10@$9. There are no large amounts pressed for sale, and it is not offered at less than $10. Pewabic sold at $3. Huron, at $1⅝.

In silver stocks, with the exception of Catalpa, there has been but little doing. Catalpa was freely pressed on the market, and declined from 47½@35c., with sales of about 7000 shares at these figures. In the later dealings there was a slight reaction, and small lots were sold at 45@42½c., closing at 40c. bid. The reports from the mine are not of a very encouraging nature. Crescent sold at 20c., against 25c. (July 13th). Bonanza Development seems to have lost its old-time activity, and transactions are light. Sales at $1¼@$1½, against $1¼, July 26th. Harshaw sold at 50c. Sullivan, at 62½@56¼c. Silver Islet declined from $5@$4.

At the Mining Board, Bowman Silver and Massachusetts & New Mexico are the principal stocks dealt in. The former is steady at 16@17c., while the latter, under favorable advices from the mine, has advanced from 3@5c., and is in good demand. The bonds are selling at $11@$12, and would seem to be a good purchase at these figures.

3. P.M.—There was no change in the market this afternoon. Quincy sold at $46, and same price was bid for it. Catalpa, 37½c. bid, 42½c. asked.

BULLION MARKET.

NEW YORK, Friday Evening, Aug. 10.

The market abroad and here the past week has been without any indications worthy of notice.

DATE	London. Pence.	N. Y Cents.	DATE.	London. Pence.	N. Y. Cents.
Aug. 4	50 7-16	110¼	Aug. 8	50 7-16	110¼
6	50 7-16	110¼	9	50 7-16	110¼
7	50 7-16	110¼	10	50 7-16	110⅛

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended August 10th, as compiled from various sources, amounted to $250,000 as against $194,000, reported for the previous week. The receipts from January 1st, 1883, to date are $6,967,974.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended August 4th	$314,030
Corresponding week last year	1,589,025
Since January 1st, 1883	7,887,064
Corresponding period last year	42,160,213

Imports.

Week ended August 4th	$143,683
Corresponding week last year	133,095
Since January 1st, 1883	7,697,919
Corresponding period last year	2,228,872

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at 4 per cent. During the week, the bank lost £88,000 bullion; but the proportion of its reserve to its liabilities was raised from 44⅝ to 45⅝ per cent, against 36 5-16 per cent at this date last year. August 9th, the bank gained £40,000 bullion on balance. The weekly statement of the Bank

of France shows losses of 20,000 francs gold and 250,000 francs silver.

BULLION PRODUCTION FOR 1883.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the date given, as well as the aggregate shipments to such date from the first of January, 1883.

The shipments of silver bullion are valued at $1.29·29 per ounce troy; gold at the standard $20.67 per ounce troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at $1.11 an ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 14⅛ per cent, to arrive at actual value.

MINES.	States.	Month of July.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont		‡$471,323
*Alta-Montana, G. L. S.	"		$10,625
*Belmont	"	12,604	12,604
Bodie, G. S.	Cal		110,535
Bodie Tunnel, G.	"		54,642
*Bonanza King, G.	"		334,223
*Boston & Montana, G.	Mont.		72,318
*Central Arizona, S.	Ariz.		35,845
*Christy, S.	Utah		145,671
*Chrysolite, S. L.	Colo.		246,676
Consolidated Bobtail	Colo.		18,723
*Contention, S.	Ariz.		557,428
Crescent, G.	Cal.		13.000
*Custer, G. S.	Idaho.		43,572
*Deadwood-Terra, G.	Dak.		172,277
*Derbec Blue Gravel, G. S.	Cal		55,148
Evening Star, S. L.	Colo.		47,061
*Father de Smet, G.	Dak.		178,163
*Frisco M. and S. Co., G. S. L.	Utah		§77.084
Gunnell, S	Colo.		58,828
*Head Center Consolidated	Ariz.		26,502
*Head Center and Tranquillity	Ariz.		60.620
*Hecla Consolidated, G. S.	Mont.		293,922
*Homestake, G.	Dak.		419,148
*Hope, S.	Mont.		41,963
Horn-Silver, S. L.	Utah	300,000	1,847,000
*Howell S. and R. Co., G. S. L.		$41,361	41,361
Idaho, G.	Cal		88,642
*Independence, G. S.	Nev.		32,991
Iron Silver, S. L.	Colo.		503,831
*Jocuistita, S.	Mex.		‡228,022
*Kentuck, G. S.	Nev		12,876
*Lexington, S.	Mont.	106,068	744,556
*Little Pittsburg, S. L.	Colo.		35,645
*Marguerite, G.	Cal		45,745
*Martin White, G. S.	Nev.		136,317
Morning Star, S. D.	Colo.		84,428
*Moulton, G. S.	Mont.		122,288
Mount Diablo	Nev		187,823
*Navajo, G. S.	"		411,642
*North Belle Isle	"		2,153
Northern Belle, S	"		395,906
*Ontario, S. L.	Utah		1,038,687
*Oxford, G.	N. S.	5,276	40,531
*Phœnix, G.	S. C.		7,700
*Pinal Consolidated, S. L.	Ariz		181,485
*Satemo, G.	N. S.		2,500
*Silver Bow, G. S.	Mont.		101,241
Standard, G.	Cal		575,822
Star, S.	Nev.		27,095
*Stormont, S.	Utah.		114,308
Syndicate, G.	Cal.		29,116
Tintic M. and M. Co.	Utah.	10,595	25,196
*Tip Top, S.	Ariz.		‡27,858
*Tombstone, G. S.	"		414,239
Wyoming Consolidated.	Cal		31.541
Yellow Jacket, S.	Nev.		193,658
Total amount of shipments to date			$11,300,095

* Official. † Net value. ‡ Assay value. § Not including alue of lead. *G. Gold. S. Silver. L. Lead.*

METALS.

NEW YORK, Friday Evening, Aug. 10.

Copper.—The situation has not materially changed, though the number of those who predict a good future for the metal is growing. We print elsewhere a letter from a correspondent, who has exceptional facilities for gathering reliable data, which will be accepted on the whole as encouraging evidence. Little has been done during the week. It is stated by some manufacturers that they have no difficulty in getting Lake copper at 15c. We can not hear of any available lower than 15½c., while the bulk is not procurable at less than 15¼c. We understand that 15c. has been offered for round lots for export, without, however, bringing out any sellers. Other brands are quoted 14¼@14½c., and bids have been made for 500,000 pounds at 14c. Refiners on this side are getting much less material than formerly, and the quantities of outside copper on the market are much smaller.

In England, Chili Bars are still well supported, being cabled £63 10s.; but Best Selected, which is free from speculative influences, is quoted lower, £67 10s., a sign which, it can not be denied, is not encouraging.

Tin.—Considerable business has been done during the week, 300 tons changing hands at lower prices, precipitated by the arrival this week by steamers of about 325 tons of Straits and 50 tons of Banca tin. Quotations for spot cash large lines Straits are now 21@21⅛c., while in jobbing lots the metal brings for Straits 21¼@21⅜c.; Lamb & Flag, 21⅝c.; Malaca, 21¼c.; and Banca, 22¼c. London cables to-day £93 10s.

Lead.—The market has been very dull, and there have been only a few sales of Common lead at 4·30@4·25c. As yet, the latter figure is not the one generally ruling; but the weakness displayed, notably in St. Louis, where lead has been offered at 3·90c., will probably carry our market to the lower level at an early date. There is very little confidence in the future of the market in metal circles, and the opinion is frequently expressed that, unless a strong demand comes to the rescue of the market, it will fall off to 4c. gradually. Buyers are very cautious, while production is going on at a steady pace.

Messrs. Everett & Post, of Chicago, wire us as follows to-day:

There have been no changes whatever in our market. Little business is doing, as the demand is only from hand to mouth. On the other hand, offerings are very moderate. Prices are nominally 4·05c. for Common and Refined.

Spelter.—The market is dull and lifeless at the range of 4⅝@4⅝c. for ordinary Western. Silesian has sold at 5c. during the week, less than the cost of importation.

Antimony.—There is no change to note.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Aug. 10.

Mr. Edward J. Shriver, Secretary of the New York Metal Exchange, publishes the following returns from 126 furnaces:

STOCKS AND PRODUCTION.	No. 1.	No. 2.	Forge and lower grades.	Grade not specified.	Total.
Stocks July 1st	13,217	21,929	46,066	17,846	99,058
" August 1st	12,178	17,342	43,970	18,250	91,740
Product'n in July	17,953	6,769	23,149	13,834	61,705

American Pig.—The dullness which we had occasion to note in our last issue has continued, and the outlook is at present certainly not as bright as many would have the public believe. The pig-iron trade is not one to adapt itself rapidly to any changes, and while the known measures taken during the first part of the year have done much toward preventing a very serious overproduction, and have brought about a healthier state of affairs, they have not effected a cure. While No. 1 is certainly not in over-supply and is firmly held, other grades are available in full quantity, and in some cases can only be moved by making concessions. We continue to quote $22@$23.50 for standard to choice No. 1, ordinary brands being obtainable at a concession of 50c.; $19.50@$20.50 for ordinary to choice No. 2; and $18@$20 for inferior to choice Gray Forge. Bessemer Pig is dull at $20.50@$21 at tidewater. Spiegeleisen has sold in considerable quantities, the higher grades at $30.50, and the lower at $25.75@$26.

The week has been an exceedingly quiet one at the Exchange, the only transaction being the sale of 200 tons of No. 1, December delivery, at $22.

Scotch Pig.—Business during the week has been fair at about our quotations. Arrivals are heavier this week, aggregating 2700 tons, and freights are cabled easier, 6s. from Glasgow.

We quote ex ship: Coltness, $23.75@24; Langloan, $23.75@24; Summerlee, $23; Dalmellington, $21@$21.50; and Eglinton, $20.50@$21.

At the Exchange, the following higher cable quotations were received: Coltness, 61s.; Langloan, 60s. Summerlee, 57s.; Gartsherrie, 57s.; Glengarnock, at Ardrossan, 55s. 6d.; and Eglinton, at Ardrossan, 49s. Warrants to-day were 47s. 3d.

Rails.—Business is restricted to small parcels for early delivery, which can not be placed at much lower figures than $38.25@$38.50. There is very little doing in winter delivery, chiefly because makers insist on $38 at mill, which buyers consider too high. There are many inquiries for such delivery, but makers, from being full of work for some time to come, are still indifferent.

Old Rails.—A firmer tone prevails and there have been sales during the week aggregating from 4000 to 5000 tons, all Ts, which are now quoted $21.75@$22.50.

Scrap.—Scrap is dull at $22.50@23 ex ship.

Philadelphia. Aug. 9.

Small transactions have characterized the Eastern Pennsylvania iron trade during the past week, with an improving inquiry for heavy fall deliveries. The users of standard and special brands are in the market this week, to ascertain prices for September and October, and in some cases have submitted orders for ninety days' requirements. Opinions differ as to the probable course of trade between now and the end of the year. Should a large consumptive demand arise, prices will certainly improve for all kinds of iron of good brands. The furnaces out of blast will, for the most part, remain out, for the double reason of low prices and uncertain future demand. Stocks of good grades are low in buyers' hands, and $23.50 was paid this week for a few hundred tons of special for early delivery. Standards are selling in small lots all the way from $22 to $23, with offers in hand at $21.50 and $21.75. Some inferior No. 1 sold at $21, but it was no better than No. 2. Standard No. 2 commands $20.50 in some cases, but sales have been made down as low as $19. Inquiries for Forge are more active than for Foundry, because of the probable resumption of the rolling-mills in September. Prices range from $17@$19.50 at furnace; the latter being for two or three special and very scarce brands. Average prices are $18, though more or less iron has been sold this week below that price; but nothing of a desirable character can be secured below $17.50. The representatives of companies hold to their confident belief in regard to the future of the market; but with the downward tendency in finished iron, consumers will have no margin to pay more than current prices. It was thought that Bessemer iron in large quantities would be sold this week; but up to present writing, sales have not been closed, though, in all probability, large transactions will be concluded before Saturday night. Prices are $21@$21.50 asked, with $20@$20.50 offered, according to size of lot. A number of small transactions in Scotch iron were closed this week.

Muck Bars are selling at $33.50@$34.50, according to quality.

Merchant Iron is weakening, and quotations run from 2·10@2·20c. The intimations thrown out as to Western competition are realized, and agents from Western mills are flying up and down the country, offering iron at prices with which Eastern men will find it hard to compete. Sales have been made below 2c. here. Common iron, 1·75@1·90c. The mills are not working full-time, and will not for three or four weeks. Meanwhile, manufacturers are endeavoring to secure orders for fall delivery.

An active demand, in a small way, has been maintained for Plate and Tank, all the week, with prices as heretofore quoted. Nothing has been closed in large lots, although negotiations are pending. The requirements will be large, as is indicated by inquiries, and the known needs of several large consumers in this locality.

A very satisfactory condition of things is to be reported in the structural iron establishments, and orders for large lots are of very frequent occurrence for early delivery. Angles are 2·40c.; Tees, 3·20c; Beams and Channels, 3·50c. Some of the sales recently made were at concessions from these prices.

Steel Rails.—The companies continue to do a very satisfactory business, but it is mainly in small orders; 5000 and 10,000-ton lots are heard of, and prices range from $38@$39.

Spiegeleisen is selling in 1000-ton lots at $30.50.

Skelp Iron is 2·10c., in 1000-ton lots.

Sheet-Iron is active for light and galvanized at card rates.

Old Rails can scarcely be quoted, as there are no stocks, and buyers decline to pay asking prices; $24 would be paid for Double-Head rails.

Scrap continues rather quiet, and railroad scrap

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Aug. 4.		Aug. 6.		Aug. 7.		Aug. 8.		Aug. 9.		Aug. 10.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.			2.30								2.40		200
Amie Con., Co.	.17	.15	.17		.18		.17						7,800
Argenta, Ne.					.25								100
Bar. & Walker, Ut.													
Bassick, Co.					9.50								25
Belle Isle, Ne.					.35		.35		.31				300
Bodie Cons., Ca.					.50				.39		.35		1,400
Breece, Co.													
Bulwer, Ca.									.75				100
California, Ne.	.39		.41	.37	.41		.43		.44		.40		3,890
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.													
Chrysolite, Co.	1.25	1.15			1.25		1.15		1.10		1.10		2,475
Cons. Va. Ne.	.39	.38	.34		.39		.43		.67		.60	.59	6,590
Crown Point													
Deadwood-Terra, Dk.													100
Dunkin, Co.			.24				.24	.20					1,500
Eureka Cons., Ne.	5.50												100
Excelsior, Ca.													
Father de Smet, Dk.													
Findley, Ga.													
Gold Stripe, Ca.									.07				500
Gould & Curry, Ne.													
Grand Prize, Ne.													
Great Eastern, Dk.					.01				.01				4,300
Green Mountain, Ca.			.74										100
Hale & Norcross, Ne.													
Hall-Anderson, N. S.													
Hibernia, Co.													
Homestake, Dk.													
Horn-Silver, Ut.	7.75	7.63	7.63		7.50		7.50				6.63		700
Hukill, Co.													
Independence, Ne.													
Iron Silver, Co.			3.05		3.10		3.10				3.15		650
La Plata, Co.													
Leadville C., Co.	.45				.35				.30				400
Little Chief, Co.					.43						.40	.39	800
Little Pittsburg, Co.											.65		100
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.					3.10		3.10						200
Northern Belle, Ne.	6.75												100
North Belle Isle, Ne.					.35		.35						200
Ontario, Ut.													
Ophir, Ne.									4.25	4.00			200
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.													
" Com., Ca.					7.00		7.50						150
Rising Sun, Ca.													
Robinson Cons., Co.	.67	.66	.76	.68	.75	.70	.75	.71	.73		.75	.74	8,700
Saint Joseph's Lead.													
Savage, Ne.													
Sierra Grande, N. M.	.90		.88				.90		.93		1.00	.94	4,200
Sierra Nevada, Ne.			4.10				5.75		5.50	5.38	4.90		1,275
Silver King, Ar.	6.50												150
Spring Valley, Ca.													
Standard, Ca.							6.63		6.63	6.00			345
Stormont, Ut.	.35				.34								520
Tip Top, Ar.					.75								100
Tombstone, Ar.													
Vizina, Ar.	.75												100
Yellow Jacket													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Aug. 4.		Aug. 6.		Aug. 7.		Aug. 8.		Aug. 9.		Aug. 10.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alta													
Alta-Montana, G.							.05		.05		.05		2,300
Am. Flag, s.													
Barcelona, s.					.45	.44	.46	.44	.45	.44	.45	.44	32,500
Bear Creek													
Bechtel Con., G.													
Belvidere													
best & B'cher, G. s.											4.50		150
Big Pittsburg, s. l.													
Bradshaw, s.													
Buckeye													
" pref.													
Bull-Domingo, s. l.													
Bye and Bye													
Calaveras, G.													
C'lav'r's W. & M. Co.													
Cal., B. H., G.					1.00								100
Central Aris'na, s.											.15		300
Cherokee, G.													
Climax, Co.			.06		.08						.09		1,700
Cons. Imp'r'l, G. s.							.08		.07		.07		1,000
Crowell, G.													
Dahlonega, G.					.02								1,000
Decatur			.03				.03				.03		3,300
Dunderberg													
Durango, G.													1,200
Eastern Oregon	.85		.86	.85	.86				.86		.86		12,900
Elko Cons.	.16	.15	.15		.15						.15		1,800
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G.													
Goodshaw, G.													
Granville, G.													
Harlem M. & M. Co.	1.35		1.35						1.30				1,100
Hortense, s.											.07		300
Imperial													
Lacrosse, G.													
Lucerne													
Mariposa Pref., G.													
" Com., G.													
Mexican, G. s.													
Miner Boy													
Mono													
North Standard, G.													
N. Horn-Silv'r, s. l.													
Ori'nt'l & Miller, s.	.13		.14		.13						.15		1,800
Parnell											.11		100
Quartz Creek													
Rappahannock, G.					.06								500
Red Elephant, s.	.07						.07		.07		.06		6,000
Ruby, of Arizona													
Silver Cliff, s.													
Sonora Con.	.25	.24	.27	.24	.30	.25	.29	.27	.27	.26	.30	.27	61,200
South Bodie, G.													
South Bulwer, G.													
South Hite							.04		.04		.04		5,200
South Pacific													
State Line, 1 & 4, s.													
" Nos. 2 & 3, s.													
Sutro Tunnel	.20						.22	.20	.22		.23	.20	10,175
Taylor Plumas													
Tioga													
Unadilla, s.													
Union Cons., G. s.			4.90				6.50		6.25		5.00		700

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 48,270. Non-dividend shares sold, 145,385.

BOSTON MINING STOCKS.

	Aug. 3.		Aug. 4.		Aug. 6.		Aug. 7.		Aug. 8.		Aug. 9.		Sales
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez											1.50		100
Amie													
Atlantic													
Aztec													
Bodie Con.													
Bonanza D.					1.87½	1.50	1.75				1.50		400
Bowman Sil	.17	.16	.17		.17		.16						8,700
Bruns. Ant.													
Bulwer													
California													
Cal. & Hec.	250				250	240½	245						87
Catalpa	.47½	.45			.47½	.45	.45	.35	.42½		.45	.42½	8,150
Central Ariz					.15								200
Climax													
Co. Virginia													
Copper F'lls													
Copperop.													
Crescent					.20								500
"Cusi"							1.57						100
Decatur													
Deer Isle													
Denver City													
Douglas	.50		.50										300
Duncan													
Dunkin	.23		.23				.25	.23					1,200
Empire													
Eureka Con.					5.75								20
Franklin	10.25				10.00	9.00							115
Hancock G.													
Harshaw	.50												500
Huron			1.50								1.75		200
Independ'ce													
Indian Q'n.											.75		300
Little Pitts.													
Mammoth	.03												1,000
Mass. & N.M.	.03		.03		.03		.05	.04					28,200
Milton													
Napa													
National													
North. Belle													
Ontario													
Osceola					20.50	20.00	20.00	19.50					213
Penn-Breck.													
Pewablc			3.00				3.25						115
Pine Tree													
Plymouth													
Quicks. com													
Quincy	46.00		46.25		46.50	46.38	46.25		46.00		46.00		202
Robinson													
San Pedro					.30		.30						300
S'ra Nevada													
S'ra Grande													
Silver Islet											4.00		50
Silver King							6.63						25
Simpson Gd													
So. Pacific													
Standard													
Sullivan	.65	.55	1.00	.95	.87½	.62½	.87½				.56¼		1,250
Sutro Tun.					.20								200
Sycamore													
Twin Lead.													
Vizina													

PHILADELPHIA MINING STOCKS.

	Aug. 3.		Aug. 4.		Aug. 6.		Aug. 7.		Aug. 8.		Aug. 9.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.													
Argent	.18	.16	.17		.17	.16	.17		.16		.16	.15	24,400
Aztec													
Battle Mt.	.03						.03						7,500
Buena					.01								4,000
California													
Calista													
Chrysolite													
Cincinnati	.10								.11		.10		1,800
Comprom'e.	.20	.19	.19						.18	.16	.16		11,900
Contention													
Con. Virg.			.02										2,300
Dauntless			.04		.04		.05	.04	.5	.04	.04		17,200
Del Monte	.04		.04						.13				7,000
Denver City			.13										
Eureka													
Girard	.03		.03		.03		.03	.01					8,500
Governor							.05						100
Grand Uni'n	.16		.15		.16	.15			.16		.17	.16	15,800
Green Mt.													
Gunnison	.25				.25				.30	.27½	.30	.27½	9,900
Homestake													
Horn Silver													
Iowa Gulch			.08	.06	.07		.07	.06	.06		.06		22,000
Iron Silver									3.00				
King Bul'on													
Ledger Con.													
Little Dia'd.			.07										2,100
Little Mat'd					.03								3,000
Little Pitts.													
L'g & D'y H													
Montana													
Mt. Sheridan													
National													
North'n B'l.													
Orion													
Orion Pref.													
Palmetto E.													
Pembina													
Penn-Breck.	.06				.08	.06	.08	.07					12,300
Permanent	.02		.02								.07	.06	6,000
Pizarro													
Pizarro Ex.					.03								1,000
Potosi													
Rara Avis											.20		500
Rara Avis E.	.08		.09				.09				.09		5,500
Record													
Rico Pion'r.													
Sierra Apac.			.20		.22								1,500
Sierra Bel le			.52½								.52½		600
Sierra G'nde	.92½	.87½	.90		.90				.92½	.90	.9	.92½	9,550
Sierra Nev.													
Silver Cord					1.50						1.42½		300
Silver King					.02		.02				.02		7,000
Silv'r Plume													
Sonora Con.													
Standard													
Sultana									.02		.02		9,500
Sutro Tun'l.													
Tombstone	1.00		1.00		1.00		1.00				1.02½	1.00	9,400
Victor									.02				12,000
Yale Mt.							.03		.03				11,000

and selected yard are not in sufficient abundance to induce holders to shade prices to meet buyers' views.

Pittsburg. Aug. 9.

Manufacturers, brokers, and representatives of furnace companies in this county and outside of it are unanimous in reporting an improving feeling and demand for both crude and finished iron; but they are not asking higher prices for any of their products. Order-books are lean, buyers are comparatively short of material, and, as a rule, can not be induced to purchase as freely as stiff prices demand. Manufacturers, however, are confident that, in a very short time, the requirements will drive buyers into market, and in view of this, are not making large concessions. Prices have reached their lowest limits. A few large sales of neutral mill iron were made at $17; best sales, $18. Red-Short iron in 500-ton lots is moving at $18@$18.50. Native Ore Foundry, $19.50. Lake Ore Foundry, $21.50@$22. Car-Wheel Charcoal iron, $30@$33. Bessemer iron sells in small lots at $21.50, but large buyers refuse to pay more than $20.50. Cash offers secure concessions from asking prices. A few thousand tons of Muck Bars have sold during the week at $34@$35. Manufactured iron is in better demand at 1·90c.; small lots, 2c. Several shipments have been made Eastward. Three more mills will start up. Some few have started from single to double turn. Nails are strong and steady at $2.90 in lots of 250 kegs and upward. Inquiries are in hand for 1000-keg lots, and offers are 15 cents less. Factories will start up next week. Stocks are sufficiently large to meet requirements. Makers think they can hold prices where they are. Large building operations are coming to light. Discounts on wrought pipes are 75 per cent; tubes, 60. Oil-well Casing, 45c. per foot; Tubing, 14@15c. The demand is active. All kinds of merchant steel are in moderate request. Prices are unchanged. Manufacturers could meet a much heavier demand. Sales of Steel Rails in small lots have been made at $38.50. Buyers of large lots will hold back. Steel Billets are quoted at $38. Spikes, 2·60c. Nuts and Bolts, 3·20c. Old Rails are quoted at $23.50; $23 offered. Old Car-Wheels, $19.50@$20. Railroad Scrap, $23 per net ton.

A general strike is threatened in the Connellsville coke region. The miners have just been organized. The McKeesport & Youghiogheny Company is putting on sixty-ton mogul engines.

A railroad eighty-five miles long will be built to the Cheat River, to bring ore into Western Pennsylvania.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Aug. 10.

Anthracite.

There are no symptoms whatever of an improvement in the anthracite coal trade; on the contrary, in several quarters we hear complaints of greater dullness, and reports of low prices are growing more numerous, because there are many who must force sales to take care of the larger amount of coal coming to them. Shippers are still engaged in placing coal bought at June prices; but soon the majority of them will have caught up. There has been some talk of putting up prices the middle of the present month; but to all appearances, the scare is now reserved for the first of next month, when probably all interests may be united to create higher nominal figures, so that those announced a month ago may be actually approximately realized. It is likely that there will be a good deal of buying then. From other quarters, the reports are fairly encouraging.

Bituminous.

Rumors of low prices continue numerous, Clearfield coal having sold to steamers as low as $3.50, a figure which, under special circumstances, may be closely approached by other buyers.

STATISTICS OF COAL PRODUCTION.

The Transportation of Coke over the Pennsylvania Railroad for the week ended August 4th, and year from January 1st:

Tons of 2000 lbs.	Week.	Year.
Penn. RR. (Alleghany Region)	770	52,753
West Penn. RR.	1,347	92,113
Southwest Penn. RR	45,828	1,222,248
Penn. & Westmoreland Region, Pa. RR	4,620	132,623
Pittsburg, Penn. RR.		501
Snow Shoe (Clearfield Region)	185	11,849
Total	52,750	1,482,087

Comparative statement of the production of anthracite coal for the week ended August 4th, and year from January 1st:

TONS OF 2240 LBS.	1883. Week.	1883. Year.	1882. Week.	1882. Year.
Wyoming Region.				
D. & H. Canal Co.	102,642	2,147,425	80,590	1,934,829
D. L. & W. RR. Co.	131,461	2,708,390	110,637	2,523,947
Penna. Coal Co.	37,069	772,296	37,712	758,379
L. V. RR. Co.	27,414	785,621	15,560	616,673
P. & N. Y. RR. Co.	4,669	119,005	3,761	114,771
C. RR. of N. J.	*	1,202,078	32,105	1,341,426
Penna. Canal Co.	15,607	222,083	12,888	243,606
North & West Br. RR.	5,963	266,931	.....	.....
	324,825	8,223,829	293,253	7,533,631
Lehigh Region.				
L. V. RR. Co.	116,903	2,759,619	113,048	2,696,526
C. RR. of N. J.	*	1,126,889	32,197	1,244,799
S. H. & W. B. RR.	1,095	32,317	581	40,370
	117,998	3,918,825	145,826	3,981,695
Schuylkill Region.				
P. & R. RR. Co.	185,089	3,968,078	159,661	3,734,305
Shamokin & Lykens Val.	+	776,324	30,473	695,318
	185,089	4,744,402	190,134	4,429,623
Sullivan Region.				
St Line&Sul.RR.Co.	851	36,035	946	32,931
Total	628,763	16,923,091	630,159	15,977,880
Increase	.....	945,211	.....	.....
Decrease	.....	.....	.....	.....

* Included in tonnage of Philadelphia & Reading Railroad.

† Reports not received.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1878..... 9,199,031 tons.
" " " " 1879..... 14,843,245 "
" " " " 1880..... 12,347,573 "
" " " " 1881..... 15,566 158 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 523,263 tons, as compared with the corresponding period in 1882.

Belvidere-Delaware Railroad Report for the week ended August 4th:

	Week.	Year. 1883.	Year. 1882.
Coal for shipment at Coal Port (Trenton)	4,904	61,569	50,701
Coal for shipment at South Amboy	17,967	461,447	493,464
Coal for distribution	18,476	457,591	415,372
Coal for company's use	5,204	90,504	75,681
Total	46,551	1,671,111	1,035,218
Increase	.....	35,893	.....
Decrease	.....	.....	.....

The Production of Bituminous Coal for the week ended August 4th was as follows:

Tons of 2000 lbs., unless otherwise designated

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lbs.	63,323	1,379,686
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	5,731	182,752
Broad Top Region, Pa.		
Huntingdon & Broad Top RR	3,321	109,984
East Broad Top	675	25,724
Clearfield Region, Pa.		
Snow Shoe	4,101	138,608
Tyrone and Clearfield	57,586	1,657,089
Alleghany Region, Pa.		
Pennsylvania RR.	8,145	257,274
Pittsburg Region, Pa.		
West Penn RR.	4,290	250,934
Southwest Penn. RR.	1,630	62,760
Penn & Westmoreland gas-coal, Pa. RR	22,047	796,919
Pennsylvania RR	15,574	320,689
Total	188,423	5,182,419

Wholesale Prices of Bituminous Coal.

Clearfield, at Philadelphia	$3.00@$3.25
" " South Amboy	3.55@ 3.80
" " New York, alongside	3.75@ 4.00
Cumberland, at Baltimore	3.15@ 3.25
" " Georgetown	2.90@ 3.10
" " South Amboy	4.00@ 4.20
" " New York, alongside	4 20@ 4.40

Horsford's Acid Phosphate
As a Refrigerant Drink in Fevers.

DR. C. H. S. DAVIS, Meriden, Conn., says: "I have used it as a pleasant and cooling drink in fevers, and have been very much pleased with it."

DIVIDENDS.

HORN-SILVER MINING COMPANY, OFFICE, 44 Wall Street,
NEW YORK, July 31, 1883.
DIVIDEND NO. 10.
QUARTERLY DIVIDEND of $300,000 has been this day declared, being three per cent on the capital stock, payable to stockholders of record on the 15th day of August next, at the office of the company. Transfer-books will close on August 8th, and reopen August 16th.
W. S. HOYT, Secretary.

SAN FRANCISCO, Aug. 4, 1883.
THE BODIE CONSOLIDATED MINING CO. this day levied assessment No. 3 of 50 cents per share, delinquent September 10th. Sale day, October 10th. Same may be paid at the office of Laidlaw & Co., 14 Wall Street.
GEO. W. SESSIONS, Secretary.

OFFICE OF THE JOCUISTITA MINING COMPANY, MILLS BUILDING, 15 BROAD STREET, NEW YORK, Aug. 8, 1883.
DIVIDEND NO. 9.
The Jocuistita Company has this day declared a quarterly dividend of FIFTY THOUSAND DOLLARS, being fifty cents (50c.) per share, payable at the office of Lounsbery & Haggin, Mills Building, No. 15 Broad street, on the 31st inst.
Transfer-books close on the 25th inst.
R. P. LOUNSBERY, President.

SPECIAL NOTICES.

AGENT WANTED.—IN AMERICA FOR the introduction of a new patented Cupola Furnace, in which a brilliant, soft, and tenacious cast-iron can be produced out of crude iron of inferior quality by adding shavings of malleable iron or steel. Address offers to DIRKS & COMP.,
Eisengiesserei in Leer, Hanover (Germany).

WANTED.—A POSITION AS MINING Engineer or Metallurgist, by a graduate of Lehigh University, with several years' practical experience. Can furnish good references from former employers, as to ability and character. Address,
B. F. HALDEMAN, Bethlehem, Pa.

G. E. RANDOLPH & CO.,
CENTRAL CITY, COLORADO,
GENERAL AGENTS FOR NON-RESIDENT OWNERS OF ACTIVE OR IDLE MINES.
Correspondence Solicited.

STEAM PUMPS.
FOR SALE.—A large number of Steam-Pumps of all makes, and ranging in size from small tank or boiler feeds up to very heavy service machines.
While the stock lasts, good bargains are open for Miners, Water-Works, Rolling-Mills, Furnaces, or any one needing to move fluids by steam. Call upon or address
JOHN A. HINCKLEY, Purchasing Agent of
THE UNITED PIPE LINES, OIL CITY, PA.

SMELTING - WORKS FOR SALE
The smelting-works, with a capacity of from 60 to 80 tons per day, situated at Socorro, New Mexico, upon a switch of the A. T. & S. F. Railroad.
These works are entirely new, and are equipped with all the most modern improvements. For sale for lack of capital to run them. For further information address
WILLIAM H. RENAUD,
Care John J. Adams & Co., New Orleans, La.
Or WM. VANSLOOTEN, 683 Broadway, New York.

GREAT MAP OF THE WYOMING VALLEY.
This, the most elaborate and accurate topographical map ever made in this country, outside of the Coast Survey, covers an area of TWO HUNDRED SQUARE MILES, and the work upon it cost over $12,000. It represents a coal-field which produced in 1874 over 10,000,000 tons of Anthracite. The Map was constructed altogether from original surveys. Every Road, Colliery, Building, or land or property line existing at the time is accurately located. The surface configuration is shown by CONTOUR LINES TEN FEET APART, VERTICALLY; and the elevation of every point above sea-level is given.
But a small edition of this Map was printed, and the plates were then destroyed.
A few copies are for sale.
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